NOTICE

THIS DOCUMENT HAS BEEN REPRODUCED FROM MICROFICHE. ALTHOUGH IT IS RECOGNIZED THAT CERTAIN PORTIONS ARE ILLEGIBLE, IT IS BEING RELEASED IN THE INTEREST OF MAKING AVAILABLE AS MUCH INFORMATION AS POSSIBLE

AUG 1 5 1980

Mission Planning and Analysis Division Development Plan for STS-2 Through STS-4

(NASA-TH-81133) MISSION PLANNING AND ANALYSIS DIVISION DEVELOPMENT PLAN FOR STS-2 THROUGH STS-4 (NASA) 158 p HC A09/MF A01 CSCL 22A

N80-30371

Unclas 6 30955

Mission Planning and Analysis Division

March 1980



National Aeronautics and Space Administration

Lyndon B. Johnson Space Center Houston. Texas



80-FM-27

SHUTTLE PROGRAM

MISSION PLANNING AND ANALYSIS DIVISION DEVELOPMENT PLAN FOR STS-2 THROUGH STS-4

Approved:

R. O. Nobles, Chief

Product Management Office

Approved:

Ronald L. Berry, Chief

Mission Planning and Analysis Division

Mission Planning and Analysis Division

National Aeronautics and Space Administration

Lyndon B. Johnson Space Center

Houston, Texas

March 1980

FOREWORD

The contents of this initial publication of the STS-2 through STS-4 Product Development Plan are consistent with the POP 80-1 Option 2 schedules and resources. The document will be updated to be consistent with POP 80-2 as soon as possible.

PRECEDING PAGE BLANK NOT FELICITY

CONTENTS

Section		Page
1.0	INTRODUCTION	1
1.1	PURPOSE AND SCOPE	1
1.2	GUIDELINES AND ASSUMPTIONS	1
2.0	SUMMARY SUPPORT PLAN	2
3.0	PRODUCTS AND SCHEDULES	2
3.1	ORBITER SOFTWARE	2
3.1.1 3.1.2 3.1.3 3.1.4 3.1.5 3.1.6	Ascent/OMS Maneuvers Aborts Onorbit Descent Navigation Consumables Management	2 2 3 4 6 8
3.2	MCC SOFTWARE	8
3.2.1 3.2.2 3.2.3 3.2.4 3.2.5	Ascent/Aborts Onorbit Descent Navigation Consumables Management	8 9 9 10 11
3.3	FLIGHT DESIGN	11
3.3.1 3.3.2 3.3.3 3.3.4 3.3.5 3.3.6 3.3.7	General Ascent/Ascent Aborts Onorbit Descent/GRTLS Non-Propulsive Consumables OMS/RCS Consumables Navigation	11 11 12 13 14 14
3.4	FLIGHT OPERATIONS SUPPORT	14
3.4.1 3.4.2 3.4.3	Flight Techniques Support	15 17 18
3.5	TOOL DEVELOPMENT	18
3.5.1 3.5.2 3.5.3	Integrated Division Tools Ascent/Abort Onorbit	19 24 24

	Si	rs 2-4
Section		Page
3.5.4 3.5.5 3.5.6	Descent	25 26 26
3.6	POSTFLIGHT ANALYSIS	28
3.6.1 3.6.2 3.6.3 3.6.4 3.6.5 3.6.6	Ancillary Data Ascent/Aborts Onorbit Descent Consumables Management Navigation	28 28 29 30 30
4.0	RESOURCES (Corresponds to Above Sections)	31

1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

This document is the second in a series of three that defines the baseline products, schedules, and resource requirements for the Mission Planning and Analysis Division (MPAD). MPAD support of STS 2, 3, and 4 are included in this document. The other documents in this series are STS-1 and transition to OPS. The document represents the baselined MPAD work plan and will be updated on a periodic basis.

The purposes of the document are to provide a management tool for use within MPAD and to provide visibility and a coordination tool for use with external organizations who use MPAD generated products.

The document is structured into two main sections, which are: (1) products and schedules and (2) resources required. The major functions addressed in each section are:

- a. Orbiter software
- b. MCC software
- c. Flight design
- d. Flight operations support
- e. Simulation tools
- f. Postflight analysis

1.2 GUIDELINES AND ASSUMPTIONS

The following guidelines and assumptions were used in developing the STS 2-4 schedules, products, and resources:

a. The flight dates are those contained in POP 80-1 Case II:

STS-2 5/1/81 STS-3 9/30/81 STS-4 12/31/81

- b. The Flight Readiness Reviews will be 4 weeks prior to scheduled launch dates for STS 2-4.
- c. Option II of Orbiter software options will be baselined; i.e., version 16 will be used for STS-1 and version 18 for STS 2-4, and version 19 for STS-5 and subs.
- d. Version 18 FACI is September 9, 1980, and CI is March 5, 1981.

- e. SAIL/FSL will implement version 18 in December 1980.
- f. SDL/SVDS comparison testing will be done on version 18 of the Orbiter software.
- g. SMS validation will not be done for version 18.

2.0 SUMMARY SUPPORT PLAN

(TBS by FM 17)

3.0 PRODUCTS AND SCHEDULES

3.1 ORBITER SOFTWARE

This task consists of all work associated with certifying the performance of the guidance and targeting, attitude and pointing, and navigation flight software for STS 2-4. The activity includes requirements development and analysis and verification support.

3.1.1 Ascent/OMS Maneuvers

This task will be responsible for developing, reviewing, and verifying onboard guidance software for ascent and insertion OMS maneuvers. Specific duties include development of essential guidance software change requests (CR's) necessary to satisfy ascent maneuver requirements, performing a detailed review of the actual flight software code, generating comparison test tapes used for verification of the onboard software, monitoring selected SAIL and FLS verification tests for guidance anomaly and discrepancy reports, and reviewing necessary guidance formulation changes. Other duties include activity supporting briefings at the OASB, organizing and supporting the guidance mode team meeting and participating in the CI and FRR. Also, specific trajectory data are generated for the guidance performance data book and finally, generating new software performance reports as required. This task will also monitor Orbiter software changes that affect sequencing in the SRB and ET separation events to assure that the current flight software is incorporated into the flight software math models associated with the SRB and ET separation simulations.

The detailed products and schedules for this task are presented in table 3.1.1.

3.1.2 Aborts

This task will be responsible for developing, reviewing, and verifying onboard software pertaining to intact and contingency aborts. Specific duties include development of essential software change requests (CR's) necessary to satisfy abort requirements, review of all CR's pertaining to aborts including generation of impact statements for non-incorporation, performing a detailed review of the

actual abort flight software code, generating abort comparison test tapes used for verification of the onboard software, monitoring selected abort related SAIL and FSL verification tests, and making and reviewing necessary abort formulation changes. Other duties include activity supporting abort briefings at the OASCB, guidance mode team meeting, and the CI and FRR. Also specific abort trajectory data are generated for the guidance performance data book. This task will also monitor Orbiter software changes that effect sequencing in the SRB and ET separation events to assure that the current flight software is incorporated into the flight software math models associated with the SRB and ET separation simulations.

The detailed products and schedules for this task are presented in table 3.1.2.

3.1.3 Onorbit

The onorbit task is divided into the three areas of attitude and pointing, onorbit OMS maneuvers, and RMS support.

3.1.3.1 Attitude and Pointing

This task consists of all work associated with certifying the performance of the universal pointing, antenna management, and prethrust attitude alignment software for STS 2-4. This activity includes CR analysis, performance testing of requirements, and verification support.

This task will evaluate all CR's that interact with the attitude and point function and report the results to the OASCB. Any attitude and pointing CR's that are required as a result of previous flight data or any other reason will be developed on this task. The performance testing of requirements will center on the additional attitude maneuver options and onorbit OMS maneuver capability that are a part of version 18 of the Orbiter software that will be used on STS 2-4. This task will also evaluate the impact of previous flight data and any scheduled flight test requirements (FTR's) for the next flight.

This activity will also support verfication activities. The detailed code for version 18 will be reviewed. Comparison tests between the SVDS and SDL will be executed for the initial version 18 release and smaller set of cases will be run prior to STS 3 and 4, if required. Also, the IBM levels 6 and 7 cases will be reviewed prior to customer inspection (CI). This activity includes the analysis of all FSL and SAIL verification cases for STS 2-4 in the attitude and pointing area. Each case will be evaluated in terms of attitude and pointing performance. Even though the SMS onorbit dynamics will have been validated previously, SMS support will be required to verify the additional attitude and pointing capability in version 18.

The products and schedules for this task are presented in table 3.1.3.1.

3.1.3.2 Onorbit OMS Maneuvers

This task consists of all work associated with developing and verifying the performance of the onorbit CMS guidance system for STS 2-4. This activity includes

GNC CR analysis, GNC performance testing, IBM verification support, and SAIL and FSL verification support.

This task will evaluate all ascent GNC CR's that interact with the onorbit guidance and targeting function and report the results to the OASCB. Any guidance and targeting CR's that are required as a result of previous flight data, performance studies, or other reasons will be developed on this task.

This task will also evaluate the onorbit OMS guidance system performance for the version 18 software requirements which contains new functional capability for STS 2-4 such as Lambert guidance and OMS short burn and recycle capability. Also, previous flight data will be analyzed to determine possible guidance system modifications. The effects of any flight test requirements or flight design constraints on the guidance system will be analyzed.

This task will support verification activities. The detailed code for version 18 will be reviewed. Comparison test cases between the SVDS and SDL will be executed for the initial release of version 18. Comparison tests for subsequent flights will be made only if warranted by significant software or flight profile modifications. The IBM level 6/7 test cases will be reviewed prior to CI. This activity includes supporting the definition of the verification test plans and procedures and analyzing the SAIL and FSL verification cases for STS 2-4. Selected cases will be analyzed in terms of OMS guidance system performance.

The products and schedules for this task are presented in table 3.1.3.2.

3.1.3.3 RMS

The primary effort of this task will be the validation of mission/payload dependent Level C data. The results of this task will consist of simulator documentation as well as technical reports/presentations in support of formal verification of the RMS auto-sequence flight software.

The products and schedules for this task are presented in table 3.1.3.3.

3.1.4 Descent

3.1.4.1 Deorbit

This task consists of all work associated with developing and verifying the performance of the deorbit guidance system for STS 2-4. This activity includes GNC CR analysis, GNC performance testing, IBM verification support, and FSL verification support.

This task will evaluate all deorbit GNC CR's that interact with the guidance and targeting function and report the results to the OASCB. Any guidance and targeting CR's that are required as a result of previous flight data, performance studies, or other reasons will be developed on this task.

This task will also evaluate the guidance system performance for the version 18 software requirements which contains new functional capability for STS 2-4 such as 7MS short burn and recycle capability. Also, previous flight data will be analyzed to determine possible guidance system modifications. The effects of any flight test requirements or flight design constraints on the guidance system will be analyzed.

This task will support IBM verification activities. The detailed code for version 18 will be reviewed. Comparison test cases between the SVDS and SDL will be executed for the initial release of version 18. Comparison tests for subsequent flights will be made only if warranted by significant software or flight profile modifications. The IBM level 6/7 test cases will be reviewed prior to CI. This activity includes supporting the definition of the verification test plans and procedures and analyzing the FSL verification cases for STS 2-4. Selected cases will be analyzed in terms of deorbit guidance system performance.

The products and schedules for this task are presented in table 3.1.4.1.

3.1.4.2 Entry-through-Landing/GRTLS

This task consists of all work associated with certifying the performance of the entry guidance systems for STS 2-4. This activity includes evaluating the impact of OTT on GNC performance, RM testing, CR analysis, FSL GNC verification test analysis, IBM CT generation, and definition of entry guidance modifications based on flight data and postflight analysis from STS-1. The products and schedules for this task are presented in figure 3.1.4.2.

3.1.4.2.1 Requirements analyses

Task 1 - GNC Performance Analysis

This task will center on the impact of utilizing version 18 of the Orbiter soft-ware which contains new functions such as optional TAEM targeting (OTT) and programed test inputs (PTI's). Also to be considered are mods resulting from STS-1 flight data. GNC performance studies will be conducted for any special test inputs of angle of attack and control surface deflections for the flight test programs.

Task 2 - IMU RM Testing

This task will evaluate the impact of flight data, mission changes, and RM threshold changes on 1MU RM performance. In addition, IMU RM studies will be conducted to validate flight test mission requirements such as test inputs, special control surface schedules, or special angle-of-attack profiles.

Task 3 - CR Analysis

All STS 2-4 GNC software changes will be evaluated in terms of performance analysis and GNC interaction effects. The results of these studies will be reported to the Orbiter Avionics Software Control Board (OASCB) for CR evaluation. Any entry guidance modification required as a result of postflight analysis will be developed and CR's prepared as a part of this task.

3.1.4.2.2 Verification support

Task 1 - FSL GNC Verification Test Analysis

This activity includes the analysis of each of the FSL GNC verification cases for STS 2-4. Each case will be evaluated in terms of guidance performance, GNC interaction, consumables analysis, and mission rule evaluation. The number of cases for each flight should be small compared to the STS-1 FSL effort.

Task 2 - SDL/SVDS Comparison Testing

This task will generate SVDS data to be used for comparison for SDL cases. Cases will be generated at least once for each mission (STS 2-4) using the operational flight profile data and more often if subsequent major profile changes are made.

3.1.5 Navigation

This task consists of all work associated with developing and verifying the navigation system for STS 2-4. This activity includes CR analysis, constants and I-load definition, navigation system hardware/software compatibility analysis, performance testing, IBM verification support, and SAIL and FSL verification support.

The major functions for which the above activities are performed include: IMU RM, IMU align, attitude processing, nav display and control, navigation parameter processing to support display, guidance, flight control, and telemetry, state propagation, state updating via filter using nav aid measurements, TACAN RM, surface feature and ground nav aid position and orientation data, and coordinate system and transformation.

3.1.5.1 Ascent Navigation

This task will evaluate all CR's that interact with the ascent navigation system and report the results to the OASCB. Any navigation CR's that are required as a result of previous flight data, performance studies, vehicle, or other changes will be developed on this task. I-loads for STS 2-4 will be updated based on previous flight data, hardware changes, flight test requirements, flight profile changes, and any other reasons.

This task will analyze current performance characteristics of the vehicle hard-ware on which the navigation system depends for inputs to ensure a compatible hardware/software navigation system. Previous flight data will be analyzed and proposed changes to the navigation system be made as required.

The arcent navigation system performance for the version 18 software requirements will be evaluated. Previous flight data will be analyzed to determine any impacts on the version 18 navigation system. Also, the effects on the navigation system of any flight test requirements, hardware changes, or flight design constraints will be evaluated.

This task will support IBM and SAIL verification activities. The detailed code for version 18 will be reviewed. The IBM level 6/7 test cases will be reviewed prior to CI. This activity includes supporting the definition of the verification test plans and procedures and analyzing the SAIL verification cases for STS >-4.

The products and schedules for this task are presented in table 3.1.5.1.

3.1.5.2 Onorbit Navigation

This task consists of all work associated with development of the onorbit navigation system for STS 2-4. The activity includes CR analysis and requirements documentation support, I-load analysis and definition, IMU hardware/software compatability analysis, IBM implementation and verification support, SAIL verification support, and FTR definition support using previous flight data and experience.

MPAD is under track task to RI/Downey to provide requirements development and documentation support. This task integrates approved requirements changes into the FSSR documentation as required. The task also evaluates all CR's that interact with the onorbit navigation function and report the results to the OASCB. Any navigation CR's that are required as a result of previous flight data, performance studies, or other reasons will be developed on this task. I-loads for STS 2-4 will be updated based on requirements analysis, previous flight data, or hardware changes.

This task will analyze the current IMU hardware performance characteristics that are a basis of the navigation software to ensure a compatible hardware/software system. After STS-1, the flight data will be analyzed and changes proposed for subsequent flights if necessary. The version 18 navigation system performance will be evaluated for the versious onorbit mission activities.

This task will support IBM's version 18 implementation activities by supporting the design and code reviews and the modular development testing activities. Support will also be given to the IBM verification activities. The detailed code for version 18 will be reviewed. Also, the IBM levels 6 and 7 cases will be reviewed prior to CI.

The task will support the definition of a verification test plan for STS-2 (version 18) and analyze all SALL verification cases for STS 2-4 in the area of

onorbit navigation. Each case will be evaluated in terms of navigation system performance.

3.1.5.3 Descent Navigation

This task consists of all work associated with developing and verifying the performance of the descent navigation system for STS 2-4. This activity includes CR analyses, I-load analysis, navigation system hardware/software compatibility analysis, performance testing, IBM verification support, and SAIL and PSL verification support.

This task will evaluate all CR's that interact with the ascent navigation system and report the results to the OASCB. Any navigation CR's that are required as a result of previous flight data, performance studies, hardware, or other changes will be developed on this task. I-loads for STS 2-4 will be updated based on previous flight data, vehicle changes, flight test requirements, flight profile changes, and any other reasons.

This task will analyze current performance characteristics of the vehicle hardward on which the navigation system depends for inputs to ensure a compatible hardware/software navigation system. Previous flight data will be analyzed and proposed changes to the navigation system be made as required.

This task will evaluate the descent navigation system performance for the version 18 software requirements. Previous flight data will be analyzed to determine any impacts on the version 18 navigation system. Also, the effects on the navigation system of any flight test requirements, vehicle changes, or flight design constraints will be evaluated.

This task will support IBM and SAIL/FSL verification activities. The detailed code for version 18 will be reviewed. The IBM level 6/7 test cases will be reviewed prior to CI. This activity includes supporting the definition of the verification test plans and procedures and analyzing the SAIL and FSL verification cases for STS 2-4. Verification cases will be analyzed in terms of descent navigation system performance.

3.1.6 Consumables Management

This task includes support in the areas of nonpropulsive and OMS/RCS consumables. The products and schedules for this task are shown in table 3.1.6.

3.2 MCC SOFTWARE

3.2.1 Ascent/Aborts

This task consists of support to the real-time MCC processors and off-line MCC processors. The offline programs include the SRB impact predictor and the launch trajector qualification system products and schedule for the LTQS are TBS.

Formulation changes necessary to support operational flights will be developed for the abort region determinator (ARD) and the abort maneuver evaluator (AME). These changes will be documented and presented to the Level B Requirements Review (BRR) Board for approval. These plans will be developed and verification of the processors will be supported.

A performance report will also be published to summarize the performance capability of each processor with the incorporated changes.

3.2.2 Onorbit

The area of cnorbit processing includes the maneuver-related software including PEG, MPT, DMT, PFNI, PFI, GPM, two-impulse, RELMAT/REFSMAT, and attitude and pointing. Support includes reconfiguration testing, which is accomplished principally by inspection, and CR processing and testing as required. Schedules for the activities are shown in table 3.2.2.

3.2.3 Descent

This task involves activity related to the entry target generator (ETG) and the entry planning processor of the Mission Control Center (MCC). For STS 2-4, this includes: (1) verifying that the MCC has been configured properly for each flight, (2) level C change request (CR) definition, analysis, and verification, and (3) incorporating aero and aero heating data as updated by flight test data analysis.

The configuration verification task requires verifying the data load for the MCC (i.e., atmosphere, aerodynamic, thermal protection system (TPS), and I-load data) and the software configuration. The basis for the verification is data generated by independent ETG and entry/TAEM simulation test beds maintained in SVDS. Generating the data requires configuring the test beds to the specified version (i.e., the specified "rev") and then running four ETG test cases and four to six entry/TAEM trajectories. The data are compared to similar cases run on the MCC. Discrepancies are then resolved. That activity is scheduled for STS-2, 3, and 4.

Two CR's are known to be required for STS-2: optional TAEM targeting (OTT) and a modification to the flightpath angle iteration in the ETG. The OTT CR has been approved, and the level C MCC requirements document has been updated to include the OTT model. Work is in progress on a test plan document. This document will describe a series of tests to verify that the CR has been implemented correctly in the MCC. The tests are similar in concept but independent from the configuration verification tests. The independent tests are more comprehensive because of the size of the change.

The change in the ETG flightpath iteration will reduce the likelihood of a flightpath angle solution not being determined under extreme conditions. The change is discussed in MDTSCO Working Paper 1.4-WP-DI232-063, "Improvements to the ETG", December 24, 1979. The work on the modification has been largely theoretical to date. Additional analysis is scheduled to increase the data base of

1

the change. The change is scheduled to go into the MCC concurrently with the OTT changes. In addition, ongoing CR support is scheduled for possible changes to the guidance or the thermal protection system (TPS) model during STS 2-4. If the change to the TAEM range prediction equation described in the STS-1 Work Statement for MCC support does not fit into the STS-1 timeline, it will be included in this item.

Updates to the MCC aero data may be required due to flight data analysis. Updates to the C_L , C_D , and C_M data used by the MCC are anticipated 4 to 6 weeks after each of the first three flights. This will allow the MCC aero data to be updated for the next flight if necessary. That activity is included on the schedule. The activity will be similar to configuration verification tests but of a lesser magnitude.

Updates to the aero heating data may also be required. Updates to these data are anticipated 2 to 3 months after each flight. This will not allow the MCC data to be updated for the next flight. However, the data will allow the MCC TPS model output to be calibrated for the following flight and the MCC aero heating data will then be updated for the subsequent flight. This update is concurrent with the reconfiguration testing for the appropriate flight, and this activity is included on the schedule.

3.2.4 Navigation

The ground navigation system includes MCC HY/SW and KSC HW/SW aid to the tracking systems and communications network. The MCC software task involves requirements changes; constants definition design review, verification support, and requirements testing.

3.2.4.1 Ascent/Descent

The MCC ascent/descent software functions include:

- a. Tracking data input processing by the high-speed input processor (HSIP)
- b. Determination of Orbiter position and velocity on a cyclic basis by the high-speed trajectory determination processor (HSTD)
- c. Computation of changes to onboard knowledge of position and velocity using the state vector update processor (SUP).

The products and schedules for this task are shown in tables 3.2.4.1.

3.2.4.2 Onorbit

The MCC orbital nav SW functions include:

a. Tracking data input processing by the low-speed input processor (LSIP)



- b. Determination of position and velocity by processing tracking data using the onorbit determination processor (CDP)
- c. Determination of downtrack position (quick-look DTP processor)
- d. Evaluation of orbital state solution using measurement residual and state comparison display driving software.
- e. Control software for the LSIP, ODP, DTP and for positioning vectors for uplink to the onboard nav system.

The products and schedules for this task are shown in table 3.2.4.2.

3.2.5 Consumables Management

3.2.5.1 OMS/RCS Consumables

This task supports the real-time MCC quantity remaining comps and mass properties, and provides the offline processors for OMS/RCS (ELDON and mini-ELDON). Products are shown in table 3.2.5.1.

3.2.5.2 Nonpropulsive Consumables

This task supports the real-time MCC quantity remaining comps and provides the offline processors for EPS, CAP, systems configuration management, and APU fuel. Products are shown in table 3.2.5.2.

3.3 FLIGHT DESIGN

This task covers all of the activities required to develop the trajectory, attitude, nonpropulsive consumables and OMS/RCS consumables profiles for the STS-2 through STS-4 flights. This includes the effort required to develope the operational flight profiles (OFP) as well as the program support leading up to the OFP. The overall schedule for the development of the OFP for STS-2 through STS-4 is shown in table 3.3.

3.3.1 General

(Write-up TBS by FM 17)

The schedules and products for this task are shown in table 3.3.1.

3.3.2 Ascent/Ascent Aborts

This task consists of performing the necessary ascent/ascent abort trajectory, SRB/ET separation, and SRB/ET disposal analyses to support the development

groundrules, conceptual flight profiles and the operational ascent/abort flight profiles for STS-2 through STS-4. Specific duties include generating and verifying all ascent and abort onboard guidance S/W I-Loads, generating onboard ascent/abort flight data file and crew activity inputs, generating ascent/abort trajectory data for MCC displays and console data packs, generating ascent/abort trajectory data for the onboard CRT displays, defining ascent/abort inputs for the MCC and generating ascent products in support of range safety. This task is directly responsible for publishing the ascent and abort volumes of the Operational Flight Profile and the associated dispersion analyses.

The schedules and products for this task are shown in table 3.3.2.

3.3.3 Onorbit

3.3.3.1 Trajectory and Attitude/Pointing

This task consists of integrating the onorbit flight trajectory and attitude timeline with the ascent and descent phases. Groundrules and constraints are compiled and integrated with flight test requirements and payload objectives to produce conceptual flight profiles and the onorbit profiles for the operational flight profile. Specific products are: conceptual flight profile documents: groundrules and constraints (OFP Vol. I), flight profile summary (OFP Vol. II), onorbit flight profile (OFP Vol. IV), attitude and pointing appendix, supertapes for CFP and OFP, and common format trajectory and attitude tapes.

Reconfiguring the onorbit trajectory and attitude/pointing for launch slips may cause the supertapes, common format data tapes, and attitude timeline to be regenerated. In addition, RELMATS and REFSMATS must be updated for the simulation data packs and flight data files.

The schedules and products for this task are shown in table 3.3.3.

3.3.3b P/H Ejection and RMS

The payload ejection systems analysis part of this task will provide a quality assurance of various flight design ejection systems by reviewing and critiqueing contractor ejection designs, operational tests and ejection analyses at contractor hardware installations. An evaluation of the groundrules and operating procedures of ejection systems with respect to crew safety and safe separation clearances will be performed. The results of the QA effort will be documented and input to specific mission groundrules and procedures documentation if appropriate and required. If independent additional dynamic analyses are necessary for problem ejection systems, these will be performed by JSC with local contractors to assure a safe and adequate, verified ejection system.

The RMS part of this task includes the establishment of RMS groundrules, constraints, and a data base for purposes of generating paylaod handling phase timelines, profiles, and I-loads for supporting OFT flight design activities and

Operational Flight Profile development, and the plume impingement FTR that is currently scheduled for STS-4.

The schedules and products for this task are shown in table 3.3.3.

3.3.4 Descent/GRTLS

3.3.4a Deorbit Targeting

For each OFP, the following products will be generated by this deorbit task:

Nominal deorbit targets
Entry RELMAT's and REFSMAT's
Block data solutions for each deorbit opportunity
Parametrics data for deorbit analysis (triple down-mode cures, burn data, tank failure capability, etc.)

These data will be published in the descent OFP document and/or by memo.

The schedules and products for this task are shown in table 3.3.4.

3.3.4b Descent

Schedules and manpower for a descent design cycle have been developed using templates or models that address the recurring tasks and products of a design cycle. Templates were developed based upon STS-1 Cycle 3 experience, but projecting increased automation and efficiency. Near-term minimum and maximum templates were developed to represent schedules and manpower in the STS-1 to STS-4 timeframe. A minimum template represents the resources required to develop a cycle update when no major profile reshaping is required, but enough changes have occurred to warrant a new cycle with attendant products. The maximum template represents a major update, for example, updated aerodynamics or thermal criteria or major mass properties changes or new angle-of-attack profile. These templates are presented in tables 3.3. These templates are the basis for schedule and resource estimation for each flight design activity. The appropriate template is chosen based upon flight design complexity and experience level. Additional tasks are then scheduled as necessary to accommodate unique flight activities requiring early or parallel activity compared to the template.

The major tasks for a descent design cycle include the design of the end of mission and AOA, the design of the GRTLS, and the definition of the contingency abort entries (CAE).

The end of mission and AOA task encompasses all those activities required to generate a flight profile and guidance I-load set from deorbit through rollout, as well as the generation of data for ground and onboard monitoring, simulator reset points, flight program verification and documentation. The AOA is

included with the nominal profile because the AOA utilizes the same set of I-loads as the nominal profile.

The GRTLS task encompasses all those activities required to generate a flight profile and guidance I-load set from external tank (ET) separation through rollout, as well as the generation of data for ground and onboard monitoring, simulator reset points, flight program verification and documentation. The CAE task involves all those activities required to generate representative flight profiles from ET separation to touchdown or ditch after identification of MECO conditions from powered CA procedures. The CAE manual flight procedures are evaluated and potential modifications are identified. The flight envelope is defined and survivability assessment performed.

The schedules for the descent design task are shown in table 3.3.4. The template used for the flight design cycle is specified for the operational flight profile for each flight and the additional tasks to be accomplished are also identified.

3.3.5 Nonpropulsive Consumables

(The write-up is TBS by FM2)

The schedules and products for this task are shown in table 3.3.5.

3.3.6 OMS/RCS Consumables

(The write-up is TBS by FM2)

The schedules and products for this task are shown in table 3.3.6.

3.3.7 Navigation

This task involves the activity related to the specification of the navigation constants required for flight design. The products and schedules for this task are shown in table 3.3.7.

The schedules and products for this task are shown in table 3.3.7.

3.4 FLIGHT OPERATIONS SUPPORT

Flight operations support is of three fundamental types. One is the analysis support to the Flight Techniques Panel to develop techniques for data management and decision logic for real-time trajectory control. The second fundamental type of support is called direct flight support and includes real-time support to the flight control team during simulated flights and during the STS 2-4 flights. The third type is the systems design support, which includes analysis of various subsystem/vehicle configurations.

3.4.1 Flight Techniques Support

Support for STS 2-4 will consist of updating techniques based upon previous flight results, revisions to flight or MCC software, additional flight test requirements, and revisions to flight profiles to accomplish flight test objectives.

3.4.1.1 Ascent/Aborts

This task will be responsible for developing ascent/abort and SRB/ET separation and disposal flight techniques, attending flight technique meetings, briefing recommended Ascent flight techniques and responding to flight technique action items.

3.4.1.2 Onorbit

- 3.4.1.2.1 Attitude and pointing. Support to flight techniques consists of analyses as requested on subjects such as timeline effects due to lighting changes, maneuvers to achieve flight test or payload objectives, and star selection and IMU alignment procedures. Products are usually in the form of presentation material and/or memos. Schedules and resources are difficult to estimate due to the uncertainty of meeting schedules and number of action items. Products and schedules for this task are shown in table 3.4.1.2.1.
- 3.4.1.2.2 Onorbit OMS maneuvers. This task will be responsible for developing onorbit OMS maneuvers flight techniques, attending flight techniques meetings, briefing recommended techniques, and responding to flight technique action items. The products and schedules for this task are shown in figure 3.4.1.2.2.
- 3.4.1.2.3 RMS.- This task will support the Flight Techniques Panel with trade studies, analyses, action-item support and presentations. For this purpose, the task will evaluate the capability of the RMS to handle specific payloads planned for OFT missions. This also includes support of the plume impingement FTR scheduled for STS-4.

The products and schedules for this task are shown in table 3.4.1.2.3.

3.4.1.2.4 Payload ejection. This task will perform quality assurance of various flight techniques with respect to ejection systems for payloads being ejected from the Orbiter payload bay and evaluate with respect to crew safety and safe separation clearances from the Orbiter. The task will document results of the QA effort and input to specific mission techniques if appropriate and required.

The products and schedules for this task are shown in table 3.4.1.2.3.

3.4.1.3 Descent

3.4.1.3.1 <u>Deorbit</u>.- Flight techniques meetings will be supported, and action items will be answered by memo or presentations to the techniques meetings.

Products and schedules for this task are shown in table 3.4.1.3.1.

3.4.1.3.2 Entry through landing/GRTLS.-

STS-2

The TAEM flight techniques must be revised for STS-2 and subsequent flights due to the incorporation of OTT. Some of the basic flight techniques concepts were developed during the simulations leading to the OTT flight software development. However, subsequent reduction of the TAEM flight corridor will cause significant revisions in the OTT TAEM profile and in the OTT procedures from those developed during the OTT simulation. This is because the dive maneuver required for large turn angles onto final approach will be severely restricted, thus limiting the maximum turn angle onto final approach. This is also the first flight that will incorporate attitude maneuvers to develop data to define the Orbiter aerodynamic and aerodynamic heating characteristics.

STS-3

Presently there are no fundamental profile changes for STS-3; however, this is the first flight that will use the autoland guidance through landing and the attitude maneuver required for flight testing will be a different set than accomplished on STS-2. Thus, the primary flight operation support activity will be to update the flight techniques based upon flight test data, to define techniques for monitoring the autoland guidance, and in providing direct flight support to the flight control team.

STS-4

STS-4 will be the first flight using a low angle-of-attack profile required to flight test the high crossrange capability. In addition, this will be the first flight that lands at KSC, and this flight will have a different set of attitude maneuvers then previous flights. Further, analysis of flight test data on STS-2 and 3 to define the Orbiter aerodynamic heating and aerodynamic characteristics may permit or may require profile modifications. Thus, the primary flight operation support activities will be revisions of the flight techniques because of profile revisions and because of Orbiter performance update using flight test data.

The products and schedules for this task are shown in table 3.4.1.3.2.

3.4.1.4 Consumables Management

- 3.4.1.4.1 Nonpropulsive consumables. TBS by FM 2
- 3.4.1.4.2 OMS/RCS Consumables .- TBS by FM 2
- 3.4.1.5 Navigation
- 3.4.1.5.1 Onboard S/W support. Crew procedures and ground support requirements for monitoring, control, and support of onboard nav will be defined/developed. Flight technique action items will be supported on demand within resource constraints.
- 3.4.1.5.2 MCC ascent/descent. Preparation and presentation of existing information is provided upon demand. Information requiring special studies or computer runs are costed and scheduled as new starts.
- 3.4.1.5.3 MCC onorbit. Action items response is provided on demand including computer runs and studies within resource availability constraints.
- 3.4.2 Simulation and Real-Time Support
- 3.4.2.1 Ascent/Abort

This task will be responsible for suporting ascent/abort guidance evaluation abort region determination, SRB impact prediction, and day-of-launch I-load evaluation. The products and schedules for this task are shown in table 3.4.2.1.

- 3.4.2.2 Onorbit
- 3.4.2.2.1 Attitude and pointing.— This task will provide sim and real time support to FOD from the flight dynamics staff support room. It will also assist FOD personnel with off-line bench programs such as the orbit attitude graphics program and the universal pointing bench program.
- 3.4.2.2.2 Onorbit OMS maneuvers. TBS by FM 41
- 3.4.2.2.3 RMS .- TBS by FM 41
- 3.4.2.2.4 Payload ejection. TBS by FM 41

3.4.2.3 Descent

3.4.2.3.1 Deorbit

3.4.2.3.2 Entry through landing/GRTLS

3.4.2.4 Consumables Management

3.4.2.5 Navigation

3.4.2.5.1 Onboard.- This task will monitor quality and control the onboard navigation and attitude determination including nav sensors, filters, and nav sensor RM. It will also recommend nav system control to flight dynamics officer.

3.4.2.5.2 MCC ascent/descent. - This task will monitor quality and select incoming tracking data and advise TRACK on data problems, control state determination process, control state update process, assess performance of above, and support FLT DYN officer.

3.4.2.5.3 MCC onorbit. This task will monitor and control incoming data and advise TRACK on data problems, select/edit data, control orbit determination process, assess performance of solution, advise FLT DYN officer on state use/quality, support tracker scheduling, and control state vector handling.

3.4.3 Systems Design Support

3.4.3.1 Nonpropulsive Consumables

TBS FM2

3.4.3.2 ET Disposal

TBS FM41

3.5 TOOL DEVELOPMENT

This task includes development of integrated division tools such as SVDS, internal branch bench programs, and real-time offline programs.

3.5.1 Integrated Division Tools

3.5.1.1 SVDS

The Space Vehicle Dynamics Simulation (SVDS) program is the primary Shuttle simulation tool used by MPAD. The SVDS is used by MPAD to support five major functions:

- 1. Vehicle performance analyses
- 2. Flight software algorithm development and testing
- 3. Flight software testing and verification
- 4. Flight techniques analyses
- 5. Generation of operational flight profile (OFP) data products

The SVDS is a complex of computer programs simulating Shuttle ascent, SRB and ET Separation, ascent aborts, onorbit, and descent mission phases. The SVDS generates trajectory and vehicle dynamics information for each mission phase. Modeling includes the physical environment, vehicle system characteristics, and the onboard software algorithms providing guidance, navigation, and control. Both six-degrees-of-freedom (6 DOF) and three-degrees-of-freedom (3 DOF) simulations are available for most mission phases. Multivehicle simulation capability is available for several mission phases.

A trajectory simulation program, which contains the modeling capabilities desired, is prepared for each flight. These capabilities include approved revisions to the guidance, navigation, and control models. Additional alterations are also made for the modeling of environment, physical properties, and data generation to reflect data source changes and output requirements definition. The models and support routines are verified individually and merged for a final verification. The completed alter capability is stored on system files for access by the user community.

The current STS-1 version of SVDS is a collection of program files, data files, and runstreams provided or collected by SDB to support the generation of the Cycle 3 OFP and the latest round of SDL comparison tests. That version of SVDS is being updated to support a scheduled revision of the STS-1 OFP. Further model enhancements and validation will be done to support continued (post-OFP) STS-1 performance and flight techniques analyses. Additionally, a programer/analyst level of effort will be maintained until STS-1 flight for unschedules user support, troubleshooting, and last minute model and flight software changes. SDB anticipates SVDS programing requirements will also arise out of MPAD's TBD postflight analysis responsibilities. A programing level of effort has been projected for that.

3.5.1.1.1 <u>Ascent/abort/deorbit.-</u> This task consists of developing the SVDS program files, data files, and runstreams that are required to simulate nominal

ascent through OMS-2 insertion, nominal deorbit, AOA, ATO, and PRTLS. The products and schedules for this task are shown in table 3.5.1.1.

- 3.5.1.1.2 <u>Ascent separation sim.</u> This task consists of CR incorporation, enhancements, and program maintenance and muds. Products and schedules are shown in table 3.5.1.1.
- 3.5.1.1.3 Onorbit sim.- This task consists of developing and maintaining the SVDS program files, data files, and runstreams that are required to simulate Shuttle orbital operations for STS-2, 3, and 4 .

Program files are separated into two basic groups:

- a. 3-DOF simulation
- b. 6-DOF simulation

Basic components of the 3-DOF staulation are:

- a. Integration of vehicle translational motion (multivehicle)
- b. Powered explicit guidance (PEG) or simple cross-product steering guidance
- c. Pseudo control system, i.e., steering interface
- d. Environment including drag and gravity
- e. Vehicle hardware including RCS and OMS engines
- f. Detailed maneuver table (DMT) software

Basic components of the 6-DOF simulation are:

- a. Integration of vehicle translational and rotational motion (multivehicle)
- Onorbit digital autopilot (DAP)
- c. Onboard orbital navigation
- d. Universal pointing processor/attitude processor flight software
- e. RCS engines with plume impingement
- f. Environment including drag and gravity
- g. IMU model
- h. Vehicle mass properties

3-DOF Orbital Sim

The current 3-DOF orbital simulation program file supporting existing requirement to produce detailed maneuver table (DMT) information. DMT tapes are generated from SVDS runstreams representing translational maneuvers and coast phases. The resulting burn data are written onto a tape and printed by a DMT postprocessor. In addition, existing SVDS display software produces a plot tape. Both of these tapes are then used to supply information to the supertape processor. The supertape processor will output a mission-dependent supertape for use by the crew activities group.

6-DOF Onorbit Sim

Program file updates to the 6-DOF sim will include:

Flight Planning Update File

Updates to the cnorbit DAP, universal pointing processor, and the star tracker will enable analysts to do flight planning for OFT missions including the following:

- a. RCS propellant usage analysis
- b. Verification of universal pointing processor and star tracking capability

Source of program file updates is a set of change requests (CR) to the flight software.

The products and schedules for this task are provided in table 3.5.1.1.

3.5.1.1.4 <u>Descent sim.</u>— This task consists of developing and maintaining the SVDS program files, data files, and runstream that are required to simulate STS-2, 3, and 4 descent through roll-out (including GRTLS).

The major simulation products in this area are:

a. STS-2 end-of-mission capability

The preparation for the STS-2 simulation requires a number of new modeling capabilities. These include OTT, MSBLS error model, input matrix testing, altered COV matrix input options, nav state update, and flight software modifications. The modifications for the guidance, navigation, and control are defined by FSSR change requests which are reviewed and those appropriate changes and additions are made and verified. A collection of the subroutines and alters are placed onto the user file along with data elements and runstreams. Following delivery of the capability to the user, continued user support for debug, correction, and minor addition is needed.

b. STS-2 GRTLS OFP capability

The task required for preparation of this product includes several items described for the ECM OFP plus some additional capabilities including: variable mass and mass properties, rollout, RCS thrust, and EMGDDT ILOAD additions. The flight software activity and user support will be similar to the ECM activities.

c. STS-3. 4 descent OFP capability

The general support of this product will be similar to the STS-2 activities and will also include the addition of several long lead-time navigation items including new ATPROC, Tacan, and IMU modeling routines.

The entry capability is to be brought to the SVDS milestone in order to provide additional capabilities for FAB analysis tasks. This activity is also a necessary part of the FDS preparation.

3.5.1.1.5 SVDS System, utilities, and postprocessors.— This task develops and maintains the SVDS system software required to operate the same tional simulations for ascent, abort, onorbit, and descent. The miscellar caus utility programs and postprocessors used in conjunction with those sime are also contained here.

The SVDS system software consists of the SVDS input processor, the SVDS initialization logic, the numerical integrators, the termination logic, and the output processing. Included in this product area is the task of periodically collecting SVDS modifications that have been made in all areas of SVDS and producing unified SVDS milestones.

The set of postprocessors consists of the program files, data files, and runstreams required to process SVDS output data to generate OFP data products. Several such postprocessors are operational and require little modification and maintenance. Others are scheduled to undergo major enhancements.

- a. RELMAT and REFSMAT Generator (ADIMOT): Documentation and user consultation planned.
- b. Format Converter for Common Data Tape (CTAPE): This program converts UNIVAC binary unformatted D-tapes to an IBM compatible EBCDIC tape. No further development planned.
- c. Common Data Tape Generator (DTAPE): This program reads output SVDS files and generates D-tapes. No further development planned.
- d. <u>Separation Picture Plot Generator (HPLOT)</u>: This program produces separation picture plots of SRB and ETSEP. No further development planned.
- e. <u>Station Contact Generator (RADAR)</u>: This program produces contact displays that describe vehicle visibility with respect to groundstations or TDRS. No further development planned.

- f. Sun Angle Generator (SUNANG): This program computes Sun look angles. No further development planned.
- <u>Supertage Generator (DASG)</u>: This program generates a tape of auxillary trajectory information stored in 10 files. This tape is required for orew activity planning by the Crew Training and Procedures Division. The program has been built and is operational but is undergoing some major revisions and enhancements. The resulting DASG program will provide all requested OFT and OPS capabilities. The work to be done under this subtask includes the review and completion of each processor, code, and COMMON standardisation and cleanup, incorporation of a version of the SVDS input processor, and conversion of the program tape output to the plot tape format both for MPAD use when DASG becomes part of the FDS and for creation of the tape deliverable to Crew Training and Procedures Division (CTPD). Each processor will be reviewed for inclusion of computations for all required OFT and OPS output parameters. Checks will be made for correct units, rotational sequences and adherence to requested conventions. Each review will include a walk-through of code for all possible processor options. All code and COMMON structures will meet SVDS standards. The processor comment cards will be checked and updated if required to reflect the final program design implementation (CD cards and code imbedded comments). A version of the SVDS input processor will be implemented to handle program input requirements. The output routines will be modified to produce a binary plot tape for use by the FDS and an ASCII "plot tape" formatted tape for delivery to CTPD.
- h. <u>Table Display Generator (TABDIS)</u>: This program generates tabular display for OFT from data tapes generated by SVDS and its postprocessor. Only a user's guide update is currently planned, but a significant TBD set of requirements is expected from FAB.
- i. Tape Print Program (TPRINT): This program prints an SVDS generalized output tape. No further development is planned.
- j. Generalized Plot Program (TRWPLT): This program generates plots for OFT from a data tape generated by another program. This is the generalized plot program used by SVDS, but it also is used across the center by non-SVDS users. Current work planned will produce a user's guide update incorporating information for OFT-1 Cycle 3 OFP capabilities, and will produce a capability to generate the entry constraint boundary plots. In addition, a significant TBD set of requirements is expected soon from FAB.

The products and schedules for this task are provided in table 3.5.1.1.

3.5.1.2 Launch Trajectory Qualification System (LTQS)

This task will continue the maintenance and mods of the LQTS throughout the STS 2-4 flights. The LTQS is a non-MCC ground software program that will analyze the launch trajectory based on specific vehicle dependent data and environmental conditions on the day of launch. This program will generate first-stage guidance I-loads based on measured winds and evaluate the adequacy of first-stage guidance constants by simulating the trajectory and determining the vehicle

forces using measured environmental conditions. A set of trajectory data will also be generated for further loads analysis by other programs. The products and schedules for this task are shown in table 3.5.1.2.

3.5.2 Ascent/Abort

This task will primarily be responsible for maintaining and developing necessary ascent trajectory generation tools to carry out the required services to satisfy the ascent/abort products and schedules. Specific ascent tools include the SVDS with the required model modifications, bench and off-line programs to support ascent guidance checkout and verification, and automated OFP and onboard S/W I-load generation processors. Specific abort tools include bench programs for the ARD, AME, stand-alone PEG; SVDS modifications compatible with abort requirements; and automated OFP and onboard S/W I-load generation processors for abort.

The products and schedules for this task are shown in table 3.5.2.

3.5.3 Onorbit

3.5.3.1 Attitude and Pointing

This task will be responsible for maintaining and developing adequate tools to carry out the required services to satisfy the attitude and pointing products and schedules.

This includes bench programs for the enboard Universal Pointing and Antenna Management Processors, the View Program, the Flight Plan Summary Program, the Reference Mission Analysis Program, the Antenna Field of View Program, and the Orbital Attitude Graphics Program.

The products and schedules for this task are shown in table 3.5.3.1.

3.5.3.2 Onorbit OMS Maneuvers

TBS FM41

3.5.3.3 RMS

This task will validate modification to and provide long-term configuration control over the PDRSS program. This task also includes maintenance of a functional simulation of the RMS flight software including tracking and evaluating RMS flight software CR's.

Products and schedules for this task are shown in table 3.5.3.3.

3.5.4 Descent

3.5.4.1 Deorbit

TBS FM41

3.5.4.2 Entry Through Landing

This task is for the continued development of the SVDS and LAND programs to support STS 2-4.

The SVDS and LAND simulations, and the associated postprocessors, provide a capability for medium— and high-fidelity simulation of atmospheric descent for EOM, AOA, GRTLS and CA. Both simulation programs can be used for 3-DOF and 6-DOF simulations of the descent dynamics. The 6-DOF simulations have a high-fidelity functional simulation of the GN&C flight software and systems. The 3-DOF simulations have a high-fidelity simulation of the G and N flight software and systems, however these simulations employ a low-fidelity model of the flight control system and the Orbiter high-frequency dynamics. Both programs in the 3-DOF and 6-DOF versions require significant computer core and computer time so that a batch mode of computer operations is required. This results in a time-consuming process for analysis requiring an iterative process.

The SVDS simulation is one of the primary descent support tools used for GN&C performance verification; for flight design verification (except for Monte Carlo analyses); for SMS validation testing; for MCC program development and verification; for performance analysis of atmospheric descent; and for development of trajectories for APU and RCS consumable analysis. The SVDS simulation was originally conceived to have end-to-end simulation capabilities from deorbit through wheels stop on the runway, but the overhead and structure of the simulation does not allow for automatic phasing of the 6-DOF deorbit simulation to the entry and rollout simulation.

Major program modification for new capabilities development are the incorporation of the OTT guidance logic and models for simulating the ASI, PTI and POPU attitude maneuvers. These models are required to support STS-2 and subsequent test flights. The simulations will also be updated to incorporate aerodynamic, aerodynamic heating and GN&C flight software model revisions based upon flight test results, and to incorporate GNC flight software modifications.

In addition to these requirements to support particular OFT flights, long-term development of the general SVDS capability will continue. This includes continued development of the automated output capability and the banking technique for relieving the Univac 1108 computer core limitations. The automated output capability will include a link between the SVDS program and the Daconics word processor for report generation; automatic output of data required for the MCC, FDF, and simulator reset points; automatic processing of I-loads from external sources; and automatic handling of data bases for SVDS simulation interfacing.

The banking concept will also be incorporated in the LAND simulation.

The capability development for the SVDS program is defined below. This capability development is divided into two basic categories. One category defines the requirements to support each individual flight. The other category is the long-term development of the general SVDS program capability that is not essential for support of an individual flight.

The products and schedules for this task are shown in table 3.5.4.

3.5.5 Consumables Management

3.5.5.1 Nonpropulsive Consumables

This task covers the consumables models updates and the consumables data base management. The consumables models are continuously being revised based on new test data (Hotfire, OIT, ATD, etc.), simulator results, and hardware changes.

The consumables data base management covers the EPS data base and its documentation via the Orbiter Electrical Equipment Utilization Baseline. The requirement is to keep it current with all of the hardware changes, LRU test data, thermal analysis results (heater duty cycles) and electrical component utilization changes resulting from changes via flight techniques, simulations, onboard software, crew activity timelining, etc.

The products and schedules for this task are shown in table 3.5.5.1.

3.5.5.2 OMS/RCS Consumables

(TBS FM2)

3.5.6 Navigation

3.5.6.1 Onboard Software Tools

Navigation bench programs will be developed, maintained, and updated for use in verification and evaluation of all navigation-related software. Support will be required in the evaluation of actual OFT mission downlist data through development of appropriate computer programs, and use of these programs to analyze navigation system performance and navigation system hardware math model fidelity.

3.5.6.2 MCC A/D Software

The high-speed ground navigation tasks are supported by both bench and offline programs. The bench programs for the HSIP, HSTD and SUP MCC processors are contained in the HSIP, HELLO and SUPPER programs, respectively. HSTD and SUP

performance analysis are performed using the HELLO and SUPPER programs, respectively. The ADDLOG program provides for conversion of the MCC 800 BPI Mission Log Tapes to Univac 1108 computer compatible tapes. The development of the HSIP, SUP and ADDLOG programs is complete, although none of these programs are documented. The HELLO program, which is the HSTD bench and analysis program, has been placed under NAS configuration control. Modifications are being performed to assist production use of HELLO. An early version of the HELLO program has been documented, but it is out of date. There are no plans to provide documentation of these programs. The MCC analysis tasks requiring support can be performed on an as needed basis to provide capabilities required to satisfy MCC A/D navigation software performance analysis requirements. The schedules and products associated with these programs are presented in table 3.5.6.2. (TBS FM8)

3.5.6.3 A/D Postflight

The ascent/descent postflight tasks are supported by the ADDLOG and PREEDIT programs. The development of these programs is complete. Modifications to these programs will be provided on an as needed basis to satisfy changes in the postflight requirements. There is no documentation for either of these programs, and none is planned. There are no products nor schedules associated with these programs.

3.5.6.4 Onorbit Ground Nav Tools

- a. Bench programs.— Bench programs are maintained for both the OFT MCC Encke Numerical Integration (NI) and for the OFT MCC Orbit Determination Program (ODP). These programs represent independent codings of the MCC programing requirements as published by MPAD. These programs have been developed and verified and are in a maintenance—only status for STS-1. Any mods to the MCC will be reflected in bench programs, however, none are anticipated at this time. The bench programs are utilized to help analyze problems that are encountered with MCC software.
- b. Offline support programs.— A large collection of offline support programs, both large and small, are being maintained for STS-1. These programs are a maintenance-only status for STS-1, although a programing staff is available to make mods as requirements are defined. Among the larger programs currently being maintained are the HOPE orbit determination program, the LOVE data preprocessing program, and the ICOAST numerical integration package. Numerous smaller software packages and peripheral programs are also maintained and modified as required. New programs are being developed to deal with new processing requirements as they arise.
- c. Postflight BET tools.- A large library of programs has been developed through the Apollo, Skylab and ASTP programs to deal with the generation of postflight BET data. These include programs to perform the following functions:

- (1) Stamp attitude information from raw data tapes provided by IDFSD through WTG.
- (2) Edit, merge, and fill attitude information to form a continuous attitude history.
- (3) Generate spacecraft ephemerides from groundtracking observations
- (4) Merge ephemeris and attitude information

These programs are being modified, as required, for STS-1. A full-scale verification of the resulting software, plus interface checks with potential users, are planned.

The products and schedules for this task are presented in table 3.5.6.4.

3.6 POSTFLIGHT ANALYSIS

The basic objectives of MPAD postflight analysis for STS 2-4 are to define the best estimated trajectory (BET) for all mission phases, evaluate Orbiter GNC performance to determine the guidance and targeting software performance, evaluate MCC performance, compare the actual and predicted flight profiles, evaluate the flight techniques, and evaluate consumables usage.

Any actions necessary to incorporate results obtained from the postflight analyses such as profile revisions, Orbiter software changes, MCC software changes, or flight technique changes are not a part of this task. These actions are included in the flight design, Orbiter software, MCC software, and flight operations tasks.

3.6.1 Ancillary Data

Determine the as-flown Orbiter position, velocity, and altitude-related parameter values as required and baselined in support of flight test objectives.

3.6.2 Ascent/Aborts

Postflight analysis will be performed, based on actual flight conditions, to determine the level of adequacy of ARD and AME performance for the flight. This will include assessment of preflight-supplied support data and procedures. Recommendations will be developed, in light of any deficiencies observed, to be incorporated into logic, procedures, or data for subsequent flights.

In addition, postflight analysis will be performed, based on actual flight conditions, to determine the adequacy of the onboard ascent guidance for the flight.

This task will reconstruct SRB and ET real-time separation parameters from actual flight data and compare these with premission planned profiles and document results.

This task will use ARIS ship tracking data to reconstruct the ET trajectory from separation through entry to calibrate rupture and breakup. This is a joint effort between FM41, and MSFC/MCC resulting in a quick look, intermediate and final postflight report. FM4 has primary responsibility.

The products and schedules for this task are shown in table 3.6.2.

3.6.3 Onorbit

3.6.3.1 Attitude and Pointing

(TBS by FM2)

3.6.3.2 OMS Maneuvers

(TBS by FM41)

3.6.3.3 RMS

This task will analyze RMS DFI data to determine RMS performance in carrying out DTO's concerned with auto-sequences. Documentation of results will be used in final verification of the RMS prior to OPS.

This task will also analyze the plume impingement flight test requirement (FTR) by taking the forces, moments, and relative position data that will be obtained from the STS-4 plume impingement FTR and comparing the results with preflight predictions. The plume model may also require updating based on these data. Evaluation and comparison runs will be made as required.

The products and schedules for this task are shown in table 3.6.3.

3.6.3.4 Payload Ejection

This task will review and perform quality assurance on all postflight data involving real-time operations of a payload ejection system. The task will determine if crew safety was adequate, safe separation clearances were realized, and if any groundrule/mission techniques or procedures alterations or changes are required to enhance or improve the ejection system operation. Results of this QA effort should be documented in specific postflight documentation if appropriate and required.

The products and schedules for this task are shown in table 3.6.3.



3.6.4 Descent

3.6.4.1 Deorbit

A nominal postflight analysis will be conducted to confirm the deorbit targets and to match the targeted burn to the actual burn. The results will be published by memo.

The products and schedules for this task are shown in table 3.6.4.1.

3.6.4.2 Entry Through Landing/GRTLS

There are three basic tasks of the entry through landing postfight analysis. These are flight profile analysis, GN&C performance analysis, and analysis of flight techniques.

The flight profile analysis includes comparison of the actual trajectory to the nominal profile and to flight constraints, evaluation of energy management, and control surface deflections. This analysis will determine how well the nominal profile was flown, determine the degree of maneuvering required to achieve the profile, evaluate transients across guidance interfaces because of state vector updating using external measurements, and will include preliminary evaluation of the Orbiter L/D and pitching moment. Results will be correlated with measured environment such as winds, atmospheric density, atmospheric pressure, and with other postflight results that determine the BET and Orbiter aerodynamic characteristics. This analysis will provide an early indication of the need for profile shaping changes.

The GN&C performance analysis will include evaluation of the entry guidance performance, and integrated GN&C performance for entry, TAEM, and approach and landing (if appropriate). Detailed analysis of the TAEM and autoland guidance is not included in this task. Purpose of this analysis is to evaluate the integrated GN&C performance compared to expected performance in the actual STS-1 environment. Results of this analysis will be used to define the need for flight software or flight profile modifications.

The flight techniques for the descent flight phase will be evaluated by comparison of mission rule constraints and decision points with flight experience. Results of this analysis will be reported to appropriate groups for action, if necessary.

Preparation for postflight analysis must begin prior to the STS-1 flight. This preparation includes development of analysis techniques and overall data flow of the analysis.

The products and schedules for this task are shown in table 3.6.4.2.

3.6.5 Consumables Management

3.6.5.1 Nonpropulsive Consumables

(TBS FM2)

3.6.5.2 OMS/RCS Consumables

(TBS FM2)

3.6.6 Navigation

3.6.6.1 Onboard

Develop FTR support products as required.

3.6.6.2 MCC Ascent/Descent

There are no tasks in this area. Any work done postflight included as a part of the preflight analysis for the next mission.

3.6.6.3 MCC Onorbit

There are no tasks in this area. Any work done postflight is included as a part of the preflight analysis for the next mission.

1 3.1 ORBITER SOPTIME		STS 2-4 PRODUCTS AND SCHEDULES	AND SCHEDOLES		-
3.1.1 ASCENT				CA 1080	
1 3.1.1.1 FIRST STACE	I JI PI MI AI MI JI JI AI SI OI WI D	JI PI NI A! MI JI	JI JI AI SI OI BI DI	JI PI NE AI HE J	St Of 111 br
PROGRAM MILESTONES	a.	4 4			
	i i i i l	CI PR6 1	FIR STS-3 FIRE S		
I REQUIREMENTS ANALYSIS	gan dan dan dan dan dan dan dan dan dan d			gu en	
f - GMC CR AMALYSIS (INC. BFS)	(AS REQUIRED)	11960)			
i - CHC PERPORAMICE TESTING	20 Co C		-		
E - IMPACT OF PREVIOUS FLE DATA		» e, e			H
S 111 S 1114 - 1				• •	
! - VARIABLE IY ! - VERSION 18		C.	20 es		
1 - UPDATED DISPLAYS 1 - GUIDANCE PERP DATABOOK	01 (L)		_ 0		
! VERIFICATION !		-		6 1 6 1	
: - CODE REVIEW		Q	e.	600 and	e. e.
MELANE 2/9 (CARE) = 1			-		
	-			• •••	
- 30L CT	a	a	-		
t - SAIL SUPPORT					
- PSL SUPPORT		- (
- 3FS MISSION DEP I-LOAD REVIEW		- a.		- es	·
		en en er			W 64 6
			•		
i Notes:					
P = Planned completion date - A =	. Actual commonletion data				
•					

C

3.1.1. Ascent CT 1980 CT 1980 CT 1981 CT 1980 CT 1981 CT 1980 CT 198	The core is a second of the co	3.1 OMBITER SOFTWARE	STS 2-4 PRODUCTS AND SCHEDULES	
The rest of the re	SETURE STATE OF THE ACT OF THE A	i.1.1 ASCENT		
PHOTO TO PRINCIPLE STATES C CA MARALESIS (IN". BPS) C PERCOMMUC INSTITUC C PERCOMMUC INSTITUCUL	PHOTO TO PRINCIPLE STATES C. C. MARALESIS (IN". BPS) C. P. MARALESIS (IN". BPS) C. MA	'	HI AI HI JI JI AI SI OI HI D I JI PI HI AI HI JI JI AI SI OI BI DI	
C CR MANALESIS C C C CR MANALESIS C C CR MANALESIS C C C CR MANALESIS C C C CR MANALESIS C C C CR MANALES C C C CR MANALES C C C C C C C C C C C C C C C C C C C	C CR MANALESIS C CR MANALESIS C CR MANALESIS (45 REQUING) (45 REQUING) (46 REQUING) (47 REQUING) (48 REQUING) (49 REQUING) (49 REQUING) (49 REQUING) (49 REQUING) (40 REQUING)	MOGRAM NILESTONES	6. 6. 6. 6. 6.	
C CR MALTSIS (IFC. BFS) C PERFORMANCE TESTING INPACT OF PREFICUS FLT DATA INPACT OF PREFICUS CATION CATION CATION CATION L CT L CT L SUPPORT L SUPPORT S MISSION DEF 1-LOAD REFIEW II SUPPORT S MISSION DEF 1-LOAD REFIEW II SUPPORT	C CR MALTSIS (IFC. BFS) C PERFORMANCE TESTING INPACT OF PREFICUS FLT DATA INPACT OF PREFICUS CATION CATION CATION CATION L CT L CT L SUPPORT L SUPPORT S MISSION DEF 1-LOAD REFIES IL SUPPORT S MISSION DEF 1-LOAD REFIES II SUPPORT II SU		CI PRE 1 213-2 1 1 1 213-3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
C PERCONNECE TESTING IPPACT OF PRETIOUS FLT DATA FTI'S FTI'S FAILS OF FTR'S FTI'S FAILS DISPLAYS GUIDANCE PERF DATABOOK CATION CATION IL SUPPORT L SUPPORT L SUPPORT B MISSION DGF I-LOAD REFIRM II SUPPORT II	C PERCONNECE TESTING IPPACT OF PRETIOUS FLT DATA INTARABLE IT WARABLE IT WEARING DISPLAYS OUTDANCE PERF DATABOOK CATION IL SUPPORT IL SU			
- IPPACT OF PRISTORS PLT DATA - EXPERTS OF TRIES - PRISTOR OF TRIES - PRISTOR OF TRIES - COULDMACK POINT POINT PRISTOR - COULD REPTING - COULD	- IPEACT OF PRETOUS PLT DATA - EFFECTS OF PTH 3 - VARIABLE TY - VARIABLE	- CHC PERPORMISCE TESTING		
- PTT - ST - TTT - ST	- WALLARE 17 - WAL	- DPACT OF PREF.OUS PLT DATA !		
- WENTARKE IT - WANTARKE IT - WENTON DESPLAYS - UPDATED DESPLAYS - UPDATED DESPLAYS - UDDATED DESPLAYS - UDD	- WERSTON 19 - WERSTON 19 - WERSTON 19 - WESTON 19 - W	- EFFECTS OF FTR'S		
- OUTDANCE PERP DATABOOK - OUTDANCE PERP DATABOOK - COOK REPTEM - COOK REPTEM - LEVELS 6/7 REPTEM - SALL SUPPORT - PSL SUPPORT - FSL SUPPORT -	- UPDATED DISPLATES - OUTDANCE PEEP DATABOOK - CODE REVIEW - CODE REVIEW - CODE REVIEW - CODE REVIEW - SAL CT - SAL CT - SAL SUPPORT - Pa. SUPPORT - Fa. SUP	- VARIABLE IN		
- COOR NETION - COOR NETION - LEVELS 6/7 NETION - SAL SUPPORT - SAL SUPPORT - PS. SUPP	- COOR REPTEM - LEVELS 6/7 REPTEM - LEVELS 6/7 REPTEM - SAL CT - SALL SUPPORT - PT. SU	- UPDATED DISPLAYS - GUIDANCE PERF DATABOOK		***
- COOR REVIEW - LEVELS 6/7 REVIEW - SALL SUPPORT - Pal. SUPPORT - Pal. SUPPORT - Fraction Der 1-Load REVIEW - Fraction Der 1-Load RE	- COOR NEVIEW - LEVELLS 6/7 NEVIEW - SAL CT - SALL SUPPORT - P'3L SUPPORT - BP'3 HISSION BRF 1-LOAD NEVIEW - BP'3 HISSION BRF 1-LOAD	MIPICATION		
- LEVELS 6/7 NETIEN - SALL SUPPORT - PSL SUPPORT	- SALL SUPPORT - SALL SUPPORT - FAL. SUPPORT - BPS MISSION BRF I-LOAD RETIEW - BPS MISSION BRF	- COOR REVIEW		
= SALL SUPPORT = SALL SUPPORT = PSL SUPPORT = BPS HISSION DEF 1-LOAD REFIEW = PSP HISSION DEF 1	= SAL CT = SAIL SUPPORT = PSL SUPPORT = BP9 HISSION DEP I-LOAD REFIEW = BP9 HISSION DEP I-LOAD	- LEVELS 6/7 REVIEW		
- SAIL SUPPORT - PSL SUPPORT - BPS MISSION BGP I-LOAD REGIES! - BPS MISSION BGP I-LOAD REGIES!	- SAIL SUPPORT - PSL SUPPORT - BPS MISSION BGP I-LOAD NGTIEN - BPS MISSION BGP III	- 301 Ct		
- PSL SUPPORT - BPS MISSION DBP I-LOAD RETIEM	- PSL SUPPORT - BPS MISSION DBP I-LOAD RETIEM	- SAIL SUPPORT	- A.	
- BPS MISSION BGP IL-LOAD REGIEW 1	- BFS MISSION BGP IL-LOAD REGIEW	- PSL SUPPORT	- a.	
		- BPS MISSION DAY I-LOAD NETIEW !	A.	
Steps:	ites:	80 60 6 1		** ** ** *
		: n		

1 .1 OMBITTER SOFTWARE		H 72 818	STS 2-4 PRODUCTS AND SCHEDULES	SECONDES.			
1 3.1.; ASCENT	1 19E					12 282 283	
13.1.1.3 ONS MAJEGIVERS	13	SI OF HIS I JI FI HI A	M 31 31 A1	A1 81 01 H1 DI	JI FI MI A1 ME	31 31 41 51	ē 18 10
PROCESS NULLESTONES				P P P	7		
I REQUIDEMENTS ANALTSIS			578-2 I				
- GHC GR AMALTETS (THC. BPS)	.	(AS REQUIRED)		6- ₁			
1 - GIC PERFORMACE TESTING 1		-	-	- • _[e. = ·		
FOR THE PROPERTY OF THE PARTY O	an (** an (** an (** an (*)						
- VERSION SO					s en en e		
- CHIDARCE PERF DATABOOK		· -	 	· ^ -	. 		
PERIFICATION			_	• -	40 gg		
- 00 to sevien		-	· •• •				
- 30, 01		. -	- -	• -	- (
- SAIL SUPPORT		-	1				
- PSL SUPPORT			-		** **		
- BES NUSSION DRP I-LOAD WRTIEN			-		- to to		_
				·			
		3. 6.					
Potes:							e et .
							€

larged completion date - & a Actual completion date

3.1.2.1 FIRST STAGE 3.1.2.1 FIRST STAGE FROCAMA MILESTON'S REQUIREMENTS AMALYS S - GHC CR AMALYSIS (INTACT & BFS) - GHC PURPOREWACK TESTING - INPACT OF PRETIOUS PLT DATA - ENPECTS OF PTA'S	AI NI JI JI AI SI OI BE	CT 1961 1 J1 F1 M1 A1 M1 J1 J1 1 F F F	981 JI AI S! OI B! D!	2964 13
S (INTACT & BPS) TESTING TOUS PLT DATA	A1 N: J: J: S: O: E: J: S: O: E: J: S: O: E: E: S: O: E: E: C: E:	# - A	At 5! O! B!	3
OUTREMENTS ARALTS: S - CHC CR MAALTSIS (INTACT & BFS) - CHC PREPOSHANCE TESTING - INPRACT OF PRETIOUS PLT DATA - ENPECTS OF PTA'S	3		-	1 1 1 1 W 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
- CHIC CR AMALTES S - CHIC CR AMALTES (INTACT & BFS) - CHIC PERFORMANCE TESTING - INPACT OF PRETIOUS PLT DATA - ERFECTS OF FT4'S	=	E 3	PER 513-3 PRE 51	·
- GRC CR MANATSIS (INTACT & BFS) - GRC PERFORMACE TESTING - INPACT OF PRETIOUS PLT BATA - BEPECIS OF PIETI'S	=	1 513-2 1		40 ga (
- CHC PERPORMANCE TESTING : : : : : : : : : : : : : : : : : : :		CONTINES)		
- INPACT OF PRETIOUS PLT DATA !				en en (
	no de 4		.	10 gar 9
- MI'S	-	· C.		
- WATABLE (T		01 01 01 01		an an
- UPDATED DISPLAYS 1 1 1 - GRIDARGE PERF DATABGEK 1 1 1		a		
WENIFICATION	-			- m
- 0000 B01694		- 6		
- LEVELS 6/7 REVIEW I				
5705				Old glas (
Tacylus Like	20 a	- 2		
Thorage and the state of the st		- 6.		## ## *
I PRIMBE GVOTTI ABG MCISSIN 188 -				en en e
· • • • • •			* der der der d	
Notes:			•	

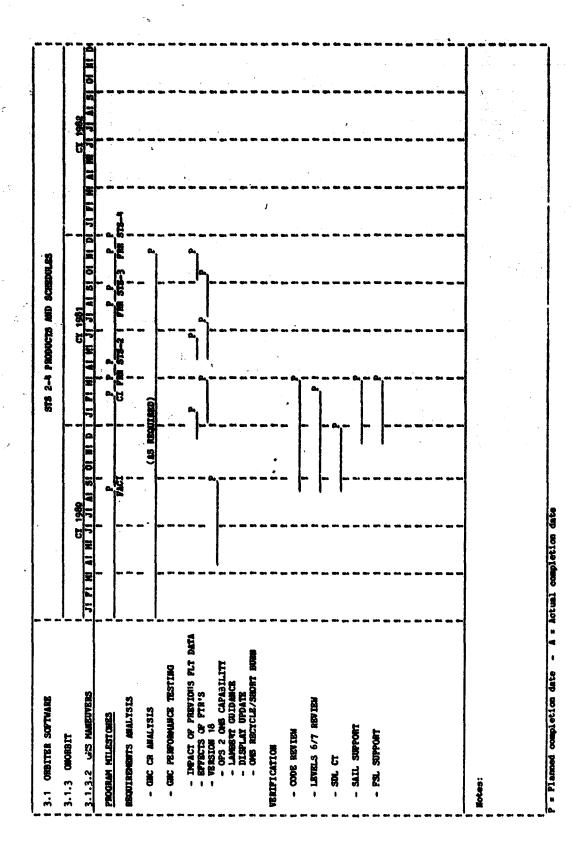
A STATE OF THE PARTY OF THE PAR

3.1.2 ABORES	CONSTRUCTION OF THE CONSTR	
	-	
3.1.2.2 SECURD STACE		JI A! S! O! #! B
PROGRAM WILKSTONES		
I REQUIREMENTS ARALYSIS !		
- ORC CR MAN, TOUS (DETACT & BES) !		4 5
- GIIC PERFORMACE TESTING	-	
- IMPACT OF PROFICES PLF DATA :		
VARIABLE IT		a a a a
- Guidence Pere 2001		in en e
PERIFICATION !		e de d
# # # # # # # # # # # # # # # # # # #		.
t - Levels 6/7 review		in Mi d
ti 18.		n en e
- SALL SUPPORT		* • •
F. F.S. Serron		⊬ een s
1 - 841234 GFO7-1 438 MISSIN 5-8 - 1		
* **	17 GE	
	00 00 00 00 00 00 00 00 00 00 00 00 00	to co
# Hotes:		•
ger den de		
		- - -

3.1.2 ABORTS 3.1.2.3 ONE NAMEOTERS 3.1.3	TACT & BPS)	H J J A S O	CT PRE 1 31 31 31 31 31 31 31 31 31 31 31 31 3		1. T. M.
TACT & BPS) TACT & BPS & TACT	131 F1 M1 A1 TACT & BPS)	MI JI SI O	CI 788 C		14 N N N N N N N N N N N N N N N N N N N
SIS S (1NTACT & BPS) C TESTING E TES	ROGRAM MILESTONES - GAIC CR ANALYSIS - GAIC CR ANALYSIS (INTACT & BPS) - GAIC PERPORMANCE TESTING				
S (JMTACT & BPS) E TESTING E TE	EQUIREMENTS ANALYSIS - GNC OR ANALYSIS (INTACT & BPS) - GNC PERPORMANCE TESTING TAMBACT OF PREVIOUS BYT DATA		113 - 125 -	1 1	
AMALYSIS MALYSIS (INTACT & BPS) GRANACE TESTING OF PREVIOUS FLT DATA S OF PTR'S LE IY N 19 D DISPLAYS CTCLE/SHORT BURN CR PERF DATABOOK CR PERF DATABOOK TEW 7.7 REVIEW 1000 DEP I-LOAD REVIEW 1000 DEP I-LOAD REVIEW	- GNC CR ANALYSIS - GNC CR ANALYSIS (INTACT & BPS) - GNC PERPORHANCE TESTING - THEACT OF PREVIOUS FOT DATA	(AS REQUIT		· · · · · · · · · · · · · · · · · · ·	00 gas 600 des des des ges 600 me des 000 t
WALYSIS (INTACT & BPS) OF PAEVIOUS FLT DAIA S OF FTR'S IN 15 D DISPLAYS CYCLE/SHORT BURN CR PERF DATABOOK OF PERF DATABOOK OF PERF DATABOOK OF PERF DATABOOK OF PERF DATABOOK IEW 100 DEP I-LOAD REVIEW	- GAC OR ANALYSIS (INTACT & BPS) 1 - GAC PERPORMANCE TESTING	(AS REQUI	(030)		50 de pa Sa Sa ge Sa sa sa sa sa s
ORMANCE TESTING OF PREVIOUS PLT DATA S OF FTR'S S OF FTR'S TY LEL IY N 19 D DISPLATS CYCLE/SHORT BURN CR PERF DATABOOK TRUE TEM 7.7 REVIEW 1.0W DEP I-LOAD REVIEW	- GMC PERPORMANCE TESTING		04 04 04 04 0	- ⁰	Di Gai Gai Gai Gai Gai Gai Gai Gai Gai Ga
OF PREVIOUS PLT DAIA S OF FTR'S LE IY IN 19 D 19 CTCLE/SHORT BUTN CR PERF DATABOOK CR PERF DATABOOK AT REVIEW 17 REVIEW 1004 DEP I-LOAD REVIEW 11 104 105 106 106 106 107 107 107 107 107 107 107 107 107 107		50 mm PP ga	20 as 40 as a		On gas the said the t
= CODE REVIEW - CODE REVIEW - LEVELS 6/7 REVIEW - SUL CT - SUL	- EPPECTS OF PTRIS - VARIABLE IY - VPASION 19 - UPDATED DISPLATS - ONS RECTELE/SHORT BURN - GUIDANGE PERF DATABOOK		• == == ==		34 See Spi
- LEVELS 6/7 REVIEW - LEVELS 6/7 REVIEW - SAL CT - SAL SUPPORT - SAL SUPPORT - SAL SUPPORT - PER MISSION DEP I-LOAD REVIEW - PER MISSION DEP I-LOAD REV	ERIFICATION : : :		-	a.	
- SDL CT - SAL SUPPORT - SL SUP	- CODE REVIEW	-	a		the spe the spe
- SDL CT - SATL SUPPORT - SL SUPPORT - PES MISSION DEP 1-LOAD REVIEW	- LEVELS 6/7 REVIEW	-			
- SAIL SUPPORT - SAIL SUPPORT - SAIL SUPPORT - PARTIENT IN THE	- צמר כב		a.	-	
SUPPORT I LLOAD REVIEW P	- SAIL SUPPORT		a.		
Malas Mession dept.			α.		
	- BFS MISSION DEP I-LOAD REVIEW		- 0		00 as th ga on as

3.1 ORBITER SOFTWARE	573 2-4 PRODUCTS AND SCHOOLES	SCHOOLES	
3.1.2 ABORTS	1 1000 72		v solt
3.1.2.4 CONTINUENCY	IP M IV IN IA IP Q IN IO IS IV IP	THE PERSON AND STREET HER PERSON	JI 27 AI S! DE RE'D
PROGRAM MILESTONES		na Ga	m ••
		1	
MEGNITALINERTS AKALTS18		(66 1	
- GHC CR AMALYSIS (INTACT & 1873)	(darrepar sk.)		; 60 mi
- CAIC PERPONEMINGS TRISTING			₩ ₩ ₩ `} \$# ₩ ₩
- IMPACT OF PREVIOUS PLT DATA	the gas of	900 can 1	e Marque (
VERSION 18	200 gas 4	pa esa (
- OF RECICLE/SHOPT BORN	200 CM		د. د. د. م
- CUIDANCE PENY DATABOOK	0		
WERLFICATION			
- CODE REVIEW		10 CEN (10 CO 1
- LEVELS 6/7 REVIEW	200 con		
- 354.CT			in c ia
- SAIL SUPPORT	an an a		
- PSE SUPPORT			jin (4 0 (
- BPT NESSTON 1991 1-LOAD REFUEL -			in the d
	in the c		in the c
	75 45	n en en	(*) 27) 26) (80) (80)
		-	
			•
	1.		
		-	1 -

1.1.3. outstitute and positive	3.1 ORBITER SOFTWARE	STS 2-4 PRODUCTS AND SCHEDULES
TATE HE ALM 21 21 AL ST OF BLUE 11 FT HE ALM 21 ALM ST HE ALM ST H	3.1.3 ONORBIT	1 1981 X2
STEANG WENDER DATA FACTI TO SERVICE THE STS-2 FIRE STS-2 FOR REQUISED) FOR REQUISED FOR REGISTER FOR REQUISED FOR REGISTER FOR REGIS	3.1.3.1 ATTITUDE AND POINTING	PIMIAIMIJIJIAISIOINIDIJIPIMIAIMIJIJIAISIOINIDIJIPIMIAIMIJI
MALTSIS MALTSIS MALTSIS MALTSIS MALTSIS MALTSIS MORTING MALTSIS MORTING MOR	PROGRAM MILESTONES	
RECHARACE TESTING TEMACT OF PERFORM FLT DATA TEMACT OF PERFORM PROPERTION TO PERFORM PRO	REQUIREMENTS ANALYSIS	C. THE STORE THE STORE THE STORE THE
TO BE FORTOUT TO PLY DATA TO PERSTON FOR THE PLANT REPORTED OF PRINT POURTING OF PRINT POURTING CATION BE RETEN BE RETE	- CR ANALYSIS	(AS REQUIRED)
TWENTY OF PREVIOUS FUT DATA THE STREETS OF PIR'S ADDITIONA ORS CARS. CARS. LLTT THE SUPPORT L. SUPPORT L. SUPPORT L. CT S. S. T.	- PERFORMANCE TESTING	
POLITING CATTON USE SERVICEN US	- IMPACT OF PREVIOUS FLT DATA 11 - EFFECTS OF FTR'S - ANDITION OF UPSRADED UNIV 11	
DE REVIEW WELS 6/7 REVIEW L. SUPPORT L. SUPPORT L. C.T. S. S	POINTING OPS 2 ONS CAPABILITY VERSION 18	
VELS 6/7 REVIEW U. SUPPORT I. SUPPORT S. S	WENTFICATION	
L SUPPORT L SUPPORT S S S S S S S S S S S S S	- CODE REVIEW	
TI. SUPPORT	- LEVELS 6/7 REVIEW	
TI. SUPPORT	Tablades Tea -	
	- SAIL SUPPORT	
	- 39, 07	
	S48 -	
	• •• •	
	M 600 48	
Rotes:		10 Can
	Notes:	



3.1 OREITER SOPTWARE	STS 2-4 PRODUCTS AND SCHEDULES		
3.1.3 CMORBIT	I Bot V2 And Value	306. 72	
3.1.3.3 BPS	JI PI MI AL MI JI JI AL SI OI BI D I JI PI MI AL MI JI JI AL SI OI MI DI JI PI	M AT HE JE	
PROGRAM HILESTONES	P P P		
AUTO SEQUENCE/FLIGHT S.FTWARE	C1 PER 518-2		
AUTO SEQUENCE PERFORMANCE TESTING	en Ca	. an an a	
Motes:			
P = Planned maniet on date = A =	= Actual completion date		l l

3.1 ORBITER SOFTWARE	•••	STS 2-4 PRODUCTS AND SCHEDULES	AND SCHEDULES		
3.1.4 DESCENT	CY 1980		CY 1981 1	CY 1982	
3.1.4.1 DECRBIT	I JI PI HI AI HI JI JI AI SI OI NI D	I JI PI MI AI MI	AI SI O! KI D!	JI PI MI AI MI JI JI AI SI	Ö
PROGRAM MILESTONES	d. d.	P P P P P P P P P P P P P P P P P P P	d d d d d	pp at ar m on or	
REQUIREMENTS ANALYSIS					
- CHC CR ANALYSIS	(AS REC	(AS REQUIRED)	- a	000 qua 1	
- PERPOSMANCE TESTING		ga 6			.
- IMPACT OF PREVIOUS FLT DATA - EFFECTS OF FTR'S - ONS SHORT BUTH/RECYCLE - VERSION 18	20			on and an an an a	
VERIFICATION	90 gan (m en c	, .
- 301 CI		C ₁		m 44 q	
- LEVELS 6/7 REVIEW				n 44 e	
- PSC SUPPORT		-		m en d	,
- CODE REVIEW)))))))))				
	20	wer god god god hin god god god god god god god god god			
			. •• as =• as &• as	. On an an an an an an	
Wotes:		-	-	-	
D . Diamond Avenilation date					

C,

O

3.1 ORBITER SOFTWARE		STS 2-4 PRODUCTS AND SCHEDULES	S AND SCHEDOLES		
3.1.4 DESCENT	CT 1980		1981		CB TOP
1 3.1.4.2 ENTRY/GRTLS	I JI FI HI AI HI JI JI AI SI OI HI	DI 31 PI HI AI H	I JI JI WE SE OF HE DE JE F	I JI PI HI AL	11 31 31 AI
PROGRAM MILESTONES	A	C.	- 6		en =
	FACT	1 CI FRR 518-2	1	7 515	
RBQ AMALTSIS	100 and 100 an		≈		
- CHC CR ANALTSIS	(AS REQUIRED)	CONTROL (CONTROL	fle en		
- PERFORMANCE TESTING		- 4			
- OTT ANALTSIS	-	 	** **		~ ~
- CHC PERPONANCE ANALYSIS I		e	a. a.		
- IMPACT OF PREVIOUS PLT DATA		Can day (2)			
- EFECTS OF FTR'S					
- GHC MONTE CARLO ANALTSES :					
- IND RM TESTING .		a	(a.		
WERTFICATION !					
- F3.		-			
- אור כז		a.	- A		
- CODE REVIEW					
- LEVELS 6/7 REVIEW !			es		
	00 00 00 00 00 00	. an an an			
Notes:					

3.1 CEDITER SCFTWARE		STS 2-4 PRODUCTS AND SCHEDULES	S AND SCHEDGLES		
3.1.5 MAVIGATION	CT 1980	1		CT 1962	
3.1.5.1 ASCENT	I JI PI NI AI MI JI JI AI SI OI	HI DI JI PI HI AI H	3 31 At St Of MI DI		SI 01 II
PROGRAM NTLESTORES	- d - d - d - d - d - d - d - d - d - d	C. Pin 513-2	Find SEE-3 Find S	1	
REQUINEMENTS DEFINITION AND RALESIS		on ga on i			
- CR AMALYSIS AND DEFINITION 1	-	(AS REQUIRED)	•	p, es, ,	
I - I-LOAD AMA.YSIS AND DEFINITION !	- d		e.	po da (•• •
Hardharr/Soptwarr oxpratability Amelisis				m es es	
- PURPORMERCE TESTING		400 gas (
- VERSION 18	(DETAILS THE BY PAG)			» — «	
- DENCT OF PREFICES PLT DATA		·		H em 4	
- EPPECTS OF PTR'S		n en e			
VERIFICATION SUPPORT					·
- CODE REVIEW					
- REVIEW LEVELS 6/7 TESTING	-				•
- SAIL SUPPORT		- 6			
- 		n ga en en e			
	PA CA CA	iri qua G ar		m es en	
Notes:					
			•		

The second second

C

		sts 2-4 products and schipples		
3.1.5 MAYIGATION 1.	CT 1980 1 31 Pt Ht At Ht Jt 31 At St Ot Ht D 1 31 Pt Ht	CT 1981 At H1 J1 J1 At St 01 H1 1	1 1 31 71 10 A	CX 1962
PROCESS IN INTERSTORES	#4 12 1 1254 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	M4 6-312 M4 1 2-125	7	
REQUIREMENTS DEFINITION AND 1 MALTS13				
- PSSR SUPPORT (DOCUMENTATION)	(darindar sv)	c ,		- <u></u> -
- CR ABALTSES	(CENTIFORM ST)	•		
- I-load analysis and dudition i				
- ING HAIDMAIR/SOTTWARE	- 6.	a		• - -
THE CHARTCASTON SEPPORT	2 dr de	• • •		.
- DESIDE REVIEWS		60 60 (10		- - •
- HODBLAR TESTING SUPPORT		- e e		, -
VERLETCATION SUPPORT				• • •
- CODE REVIEW				
- LEVILS 6/7 TESTING SUPPORT		N 60 6		
- SAIL SUPPORT		-		• • • •
		== co (-, ·	
				P. 40 (
		co c		· · · · · · · · · · · · · · · · · · ·
liotes:				

1 3.1 ORBITER SOFTWARE		is .	STS 2-1 PRODUCTS AND SCHOOLILES	AND SCHEDULES			
1 3.1.5 MATEGATION 8	086. Y3		8	1961		CT 1982	
1 3.1.5.3 DESCRIT	I JI FI HI A1 HI JI JI A1	St of HI D 1 31	PI HE AT HE JE	Ji Ji Vi Vi Si Ol III I	Dt 31 P1 At At At	31 21	St Of 181 D
PROGRAM MILESTONES		William	2 P P P P P P P P P P P P P P P P P P P	Pin STS-3 Pin	 H,		
I REQUIREMENTS DEFINITION AND I							
- CR 4844.TSIS	-	(AS REQUIRED)		-	, e e	, • (.
1 - I-LOAD AMALTSIS AND DEFINITION I	-	-	-				
! - HAMDMARK/SOFTWARK CONFICENCIALITY: ! AMBLESTS:		- -	- -	-			
i - PEPCHHOCK TESTUK		er es (~ = •	
- VZRS 2001 16	(DETAILS THE RY PIG)			» «» •	* = •		
- Deact of Privious P.f. Dath		> a. 4			 		n es =
- EFFECTS OF PTR'S				» — =			
PERIFICATION SUPPORT				• •• •			
1 - CODE HEVIES				• •			
- REVIEW LEVELS 6/7 TESTING		•		• 🚓 🖻		•	
- SAIL SUPPORT				a			
- PSL SUPPORT						• •	•
				» «		. <u></u>	n es es
				es e s			
Moton:						; !	
••••••							

C

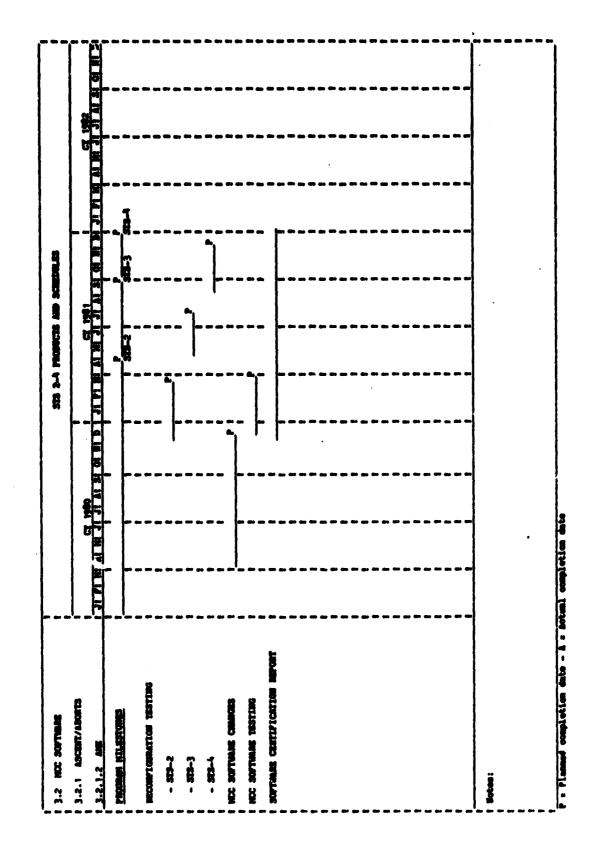
2.1 Contrar continue													1
-				ſ									i
1 3-1-0 CARSUMBLES REMOMENTS		3	1980			3	181			8	1983		
			-					5	5			5	
			Pacity.		3	3.55.2	3	15-3 PM S	1				
STREETSHOO WISTONGS-HOW I		* ** **				 I							~
1 - Ses verification support	 (<u>g</u>												
1 OME/INCS CONSTRAINES	- (189 24 -												
	-	_	-					-			•		-
	-	_	-	-	_	_				_	-		
	-	_	-			-							
	-	-	• •	. =					., •				
				((_	-	•	_	.	_	-
	-	-	-	_	_	_		-	-	_	_	-	_
	_	_	-					-	. =1				
-	-	_	_	- ==			-		- =		• =	• •	
	_	-	-	_				• •					•
		•	•		-			» «			» .		
	-		-								. =		-
-	-	-	-	-							•	• =	•
	_	-	-	-					_				•
	-	-		-	-	-	_	_	_	_	-	-	_
	_	-	-		-	-		-	_	_	_	_	-
								-	•		_	_	-
	.		*	- (-		<u>.</u>	-		-
		-	» «	-		_	_ `				-		-
•	* e		-	- •				•	-				
-	-	-	-	-				•					•
••	_	-	-	•				•			. ~		• •
	-	-	-	•			-	-	_				-
	-	-	-	-	-	-		-	-		-	-	-
				(((-	-		_	_	***
		-											-
													Ī
f Notes:													_
													-
								•					
1 600												;	-
•••													•
and the state of t													7
			9										

3.2 NCC SOFTWARE	STS 2-4 PRODUCTS AND SCHEDGLES	SCHEDGLES	
3.2.1 ASCENT/ABORTS			
POPTION WIT ESTIMES	A SI OF HI D 31 PT HI AI H		
	200	1 1 2:3-1 1 2:3-1	
RECORP TOTAL TESTING			
. 325			
CA SEPORT			
NECRESSION TESTING (VARIABLE IT CONFLETE)			
SOTISME CERTIFICATION METOR			
(c) (c)			

C

C

C



1 3.2 HC SOTTANE	17 ST3 PAGETS 418	S 400 SCHOOLAS		[
1 3.2.1 ASCHIT/ABORTS	7 086 15	1961	2 96 3 15	
13.2.1.3 LINE	1 31 PM AL M 31 31 AL SE 02 111 9 12 17 11 M AL M 1	1 11 10 15 17 17 1	10 16 17 18 18 18 18 18 18	Ä
PROBER VILGERARS	200	200		
sertane ca-s				
SOTTONE VEATTCATION				
TOCERUMS HEREOL.				
I THE SERVICE	- }			
-		-		-
				- •
· •			-	
•				
				
J		•••		~ ~
				-
			# COT (
				7
Botes:				
-				
P . Planned completion date - C = 100	ocken) completion date			ĺ

3.2.2 GROBETT CT 1980 CT 1980 CT 1980 CT 1981	1 3.2 PC SOFTIARE			STS 2-4 PRODUCTS AND SCHEDULES	TS AND SCH	ST DOE				
FIGATION NEPORT TES PROFILE TO BE DESCRIPTION OF THE PERMITTEN AS IN ALL SELECTION NEPORT TESS PROFILE TESS P	1 3.2.2 CHORBIT		1980		1981				2	
TCATTON MEPONT TESTING TTESTING TTESTIN		F	31 41	FI N. A! HI	티		2 2) I III JI	11 11 31	
STING REPORT	PROCERAM MILESTONES	- -		- C	- -	S. 2. 3. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.	 I			
STING STING INTOIN MEPONT	ATTITUDE AND POINTING								e+ e+ c	
TESTUMC TESTUMC	1 - RECOMPTIGURATION TESTING				e			= a =		
TESTURE REPORT	- 578 2	» •		" en e		:		t es 44	•	
TESTUMO REPORT	- 573 3	188	- La	* en •	=					
TESTURE REPORT	- 573 4	or en e								
TESTUMO TESTUMO TCATTOM NEPOMT	- CR SUPPORT									
TESTING TCATION NEPORT	- SOFTWARE CENTIFICATION REPORT									
ON TESTING IPICATION NEPORT	HAMEOVER SUMBLATION	* an *			• •					
IFICATION REPORT	- RECOMPLEMENTION TESTING		16 qua 4	• ga 0				· •• ••		
IPICATION REPORT	- 573 2	• •• •	• ••• ••	• •• ••						,
IFICATION REPORT	- 513 3	TBS		• • •						
IPICATION REPORT	# STS -		» es =	• •• •	• 					-
IPICATION REPORT	- CB SUPPORT	* •• •			•					
	- SOFTHARE CERTIFICATION REPORT									
	DECRETT TARGETING	287		• es =				·		
			** das GP	- ₀₀		• gay (FI				
	Hotes:							() () () ()		
					•			1		:
	er ac			•				:		ŧ

1 3.2 HCC SCRTWARE	55	STS 2-4 PRODUCTS AND SCHEDULES	EDULES		
1 3.2.3 DESCENT	C7 1980	CY 1981		CT 1982	
	I JI BI MI VI JI JI VI SI OI MI DI JI PI	HI A! M! J! J! A!	St of Ht of Ji Pi	MI AT HI JI JI AT SI OS	Ē
PROGRAM MILESTONES	-	O.	- 6.		
	Ga Ga G	1 ST8-2 1	512-3 515- 		
i ngameradaharian resting					
1 - 573 2					
- 575 3					
- STS -	10 mm 1	} 	·		
CR DEPTHITION AND AMALISIS	20 des 4				
110 -	us dan d	en e	F en 1		
Marie 1837 -	200 age 4	P+ cm 4	in ga (201 an 1	P4 (gas 1
- Veriet test bed	00 gas 1		·	PM 400 4	
- RUM AND DOCUMENT TRST DATA	Ch.	e. 1		M ga 4	
- COMPARE AND TROUBLESHOOT	Ou	m ga (m on (P	M 600 1
I - RESET 'N ETG FLIGHT PATH I ANGLE LOOP	200 QUA CON	M		94 QQ Q4 96 Que Q4	
I - ANALYSIS AND CR DEFINITION !	a a				-
- TEST PLAN					
- RUN AND DOCUMENT TEST DATA	no des e				
: - COPPARE AND TROUBLESHOOT :					
Motes:					
I P s Planned completion date - A - Actual completion date	tual completion date				

1.5.3 pages (Conclude)	3.2 MCC SOPTWARE	STS 2-4 PRODUCTS AND SCHELULES	
(C'D)	S.2.3 DESCENT (CONCLUDED)	1980 I CT 1981 I	CY 1982
		AI MI JI JI AI SI OI NI DI JI PI MI AI MI JI JI AI SI OI BI DI JI PI MI	MI JI JI (1 31
	CR DEPINITION AND ANALYSES (COMC'D)!	24	
	- CMCGOING OR SUPPORT	W W W W W W W W W W W W W W W W W W W	
2-575 2 ACTIVITY 5-575 3 ACTIVITY 5-575 3 ACTIVITY 2-575 4 ACTIVITY 2-575	NEMO DATA UPDATES (CL., CD. CH)		a 454 ted
ATING DATA UPDATES STS 2 ACTIVITY -STS 4 ACTIVITY -STS 4 ACTIVITY -STS 4 ACTIVITY -STS 4 ACTIVITY -STS 5 ACTIVITY -STS 5 ACTIVITY -STS 5 ACTIVITY -STS 6 ACTIVITY -STS 7 ACTIVITY -STS 7 ACTIVITY -STS 7 ACTIVITY -STS 6 ACTIVITY -STS 7 ACTIVITY -STS	- PRE-STS 2 ACTIVITY - PRE-STS 3 ACTIVITY - PRE-STS 4 ACTIVITY	Q	
P-STS 2 ACTIVITY P-STS 4 ACTIVITY P-STS	AERO HEATING DATA UPDATZS	W	. 404 404
Motes:	- PRE-STS 2 ACTIVITY - PRE-STS 4 ACTIVITY - PRE-STS 4 ACTIVITY		
	Motes:		

12.4 March March	9.2 MCC SOFTWAPE	STS 2-4 PRODUCTS AND SCHEDULES	
1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	3.2.4 NAVIDATION	1500 Au	
	3.2.4.1 ASCENT/DESCENT	PINIAIMI JI JI AI SI OI NI DI JI EI MI AI MI JI JI AI SI OI NI DI JI EI MI AI MI JI JI	
4	PROGRAM MILESTURES	a.	
		STS-3	
	STS 2		
	- SOPTHARE EVALUATION		
	- CONSTANTS DEFINITION		
	STS 3	20 20 20 20 20 20 20 20 20 20 20 20 20 2	
- CONSTANTS DEPTAITION - SOFTWARE EVALUATION - CONSTANTS DEPTAITION - CONSTANTS DEPTAITION - Movee:	- SOFTWARE EVALUATION		
- CONSTANTS DEPTHITION - CONSTANTS DEPTHITION - CONSTANTS DEPTHITION - Modes:	- CONSTANTS DEPINITION		.
- SOFTWARE EVALUATION - CCNSTANTS DEFINITION - Motes:	SIS #		.
- CCNSTANTS DEFINITION Works:	- SOPTHARE EVALUATION		- •••
	- CCNSTANTS DEFINITION	60 Garage	
Motes:			. .
		200 de	 .
Moces:		200 (000)	. . .
Motes:			- -
Motes:			
Notes:			
	Wotes:		:

3.2.4 MAY JATTON 3.2.4 C GORBELT 3.2.4.2 GORBELT 3.2.4.3 GORBELT 3.2.4			
252 262 263 264 265 265 265 265 265 265 265 265 265 265	3.2.4 NAVIGATION		
CATTON 1870NT CATTON	3.2.4.2 ONORBIT	I JI FI MI AI MI JI JI AI SI OI NI	DI JI PI HI AI HI JI JI AI SI
110N 1820NT	SENOTING IIM MARDORG	1	
			STS-4 ! !
OS PTUARE CENTIFICATION 1870NT SOFTWARE CENTIFICATION 1870NT Notes.	RECONFIGURATION	941.	
SOFTWARE CENTIFICATION NEPONT Notes:	PERFORMANCE TESTING		me que l
SOFTWARE CERTIFICATION NEPORT Notess.	CR SUPPORT		gas 1
Notes.	SOPTWARE CERTIFICATION REPORT	20	
Notes 3.	-		
NOVes 3.			
	•		
Obes5:			(
	•		
Obess:			
	. •		
Obess.			
			•
			-
			-
	-		
	-		
Notess.			
Hotes:			
lotess.			
lotes.			1 1

1 3.2 MCC SOFTWARE	. ••• <u>-</u>		STS 2-4 PRODUCTE AND SCHEDULES	S AND SCHEDULES				
1 3.2.5 CONCUMABLES MUNACIBIENT	C. 1980		10	CY 1981		CY 1982	982	
5.2.5.1 CAS/RCS CONSCIABLES	I JI P! H! AI M! J! JI A!	A! S! O! M! D!	JI PI H! A! M! J	JI JI AI SI OI NI DI JI FI MI	I DI JI FI P	A1 MI	JI JI AI SI OF	D
PROGRAM MILESTORIZE	*		_ 0.	_ ^	a.		 -	
			STS-2	878-3	S13.4			
MASS PROPERTIES		san (n ens ((* == *	
- RECOMPIGURATION		De gas :	in the state of		-			
- 573 2		a		-	- -			
- 872 3	i (TBS PN2) i	0. 0.					***	
4 55 4					~ •••		9 1 9 1	
NOCTS -		ten den :			-		***	
- MINI-Z.DOM	ten gan (ma gan (P4 (D4 1				
- SOFTWARE CERTIFICATION	P4 654 1	Di gas (ga ma i		D		De en 1	
		PS 604 (ino mgo (ga :	70 gan (
			P-1 (SA)		2 4 2 4 1		-	
	e	en en	 	F- 64				
	e. e. e. e.	a. a.	••••	8 - 6 -	** **		***	
			•••	•••			m. •	
			. 54 4		•			
			. ••	. .	,, C .,			
	600 GO							
Mot bu								

3.2 MCC SOPTWARE		STS 2-4 PRODUCTS AND SCHEDULES	DULES	
1 3.2.5 CONSUMABLES MANAGEMENT	CY 1980	CY 1981	1 CY 1982	
1 3.2.5.2 NON-PROPULSIVE CONSUMABLES	I JI PI MI AI MI JI JI AI SI OI NI	I=I	SI OI NI DI JI PI MI AI MI JI JI AI	St Of MI DE
PROGRAM MILESTONES	na .		1	
-	2 .	1 STS-2 1 STS-3	-3 STS-4 1	
I IN COMPS	(TBS PN2)			
- QUANTITY GAGING PVT CURVES	20 ma (ma que (no con c	
I OFFLINE TOOLS	pri des :			
- RECONFIGURATION				
- EPS				
- CAP	10 (20 (00 mm 0	
- CONFIGURATION MANAGEMENT				
1 - APU PUEL	on the t		P4 200 (
CR SUPPORT			·	
SOFTWARE CERTIFICATION	me de d			De ga (
		 	200 des	
die des				

4 84 4	des g			
w.	po		ne 10	
	600 GO		8- 6- 8- 6-	
! Notes:				
a. 51 .				***
M day				

3.3 FLIGHT DESIGN		STS 2-4 PRODUCTS AND SCHEDULES		
3.3.1 CENERAL	t CY 1980	CY 1981		
	I O M TO IS IN SE	JI PI MI AI MI JI JI AI	SI OF MI DI JI FI HI AL HI	O JA JC IS IV IS IS
PROGRAM MILESTONES		co de la companya de	 1	** ** **
DATA MANAGEMENT ON STR. 2 TUBIL			 	
STS-4 PRODUCTS		Bas (
- INITIALIZATION CATA PACKAGE	pe dan d pe det d pe det d			
- I-LOADS CR COORLINATION	90 gan d 90 gan d 90 gan d	00 000 (er en (M ga (
- SINULATOR DATA FACK	po den (por den (me gas (P
			. On on the first and the first the	. ₍₂₎ (3) (3) (3) (3) (3) (3) (3) (3) (3) (3)
Notes:			•	
			!	

1 3.3 FLIGHT DESIGN				STS 24	PRODUCTS A	STS 2-4 PRODUCTS AND SCHEDULES	ø				
1 3.3.2.1 ASCENT		CY 1980			1 15	28			5	CY 1982	
- Gara	JI FI H! A!	NI JI JI VI	SI OF HID	1 31 51 11	11 A! M! 31 3!	JI AI SI OI HI	11 01 31	FIM	IC IM IV	JI A! S!	0 11 0
PROGRAM MILESTONES			-	- -	- 4	a.			-		
	-	·			1 543-2 1	STS-3				•••	
I STS-2 THRU STS-4 ASCENT PERFORMANCE!		-	-		•	 	- -		, =-	, ,	
# SCAM						 	-				
GROUNDRULES AND CONSTRAINTS	• •					. 			-	-	
i martists and ustration	* **			, e.		. =-			•	•	
- ASCENT	-	-	-	-		-	- -			20 (20	
1 - SRB SEPARATION !					.	.	-	-	-	•	
ET SEPARATION				- -		••					
1 mm 4	_		_	_	_	-	-				
- SKB DISPOSAL	-	-		-	-						
i - ET DISPOSAL			-			.	· -	(
I STS-2 OFP ASCENT PROFILE			-	-							
# - ASCENT		e- e-		a. 		<u>.</u>	e. e.	a. a.			
			-	Ļ '		·	 •			•.	
- SRB SEPARATION	₽ 1 2 -		-	<u>.</u>		-					
1 - ET SEPARATION		•	.	. -	· ·	· ·					_
- SRB DISPOSAL	 .		-	. ^		•	. •• •				
FT DISPOSAL	e ,	n e ro (-	.		. .		• •• •			
1 - SRB/ET RANGE SAFETY					 -						
g. 64 m	an 94 an	en en e				an an an	a. .	en en en	p. GI 61		
i Notes:							{				
901 607											
g., 6 -1											
gas de											

3.3 FLIGHT DESIGN	STS 2-4 PRODUCTS AND SCHEDULES	
3.3.2.1 ASCENT (CONTINUED)	f CY 1980 f CY 1981 f	
	SI OF NI D 1 JI FI HI AT HI JI JI AT SI OF HI DI JI PI HI AL HI	S OF MI D
SUPPORT FOR STS-3 AND STS-4 CONCEPTUAL FLIGHT PROFILES		n g, 61
STS-3 OFP ASCENT PROFILE		.
- ASCENT		Bo G P (
- SEB SEPARATION	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	.
- ET SEPARATION		» • • •
- SRB LISPOSAL	to the day of the day	
- ET DISPOSAL	the day of	. - .
- SRB/ET RANGE SAFETY	200 CO	•• •
- ASCENT		. • .
STS-4 OFP ASCENT PROFILE		. ~ .
- ASCENT		
- SRB SEPARATION	20 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	. • •
- ET SEPARATION	the day of	, e ,
- SRB DISPOSAL		
- ET DISPOSAL	20	 ,
- SMB/ET RANGE SAFETT	200 and 1 an	. ••••
- ASCENT	20	h e n en
Hotes:		
P : Planned cranletion date . A . Actival completion date	Artinal remailetion date	

13.3 FLIGHT DESIGN	 N Sh G	STS 2-4 PRODUCTS AND SCHEDULES	
1 3.3.2.1 ASCERT (CONCLUDED)			CT 1962
	I ST PT HT AT HE JE JE AS SE OF HED I JE PT HE AT HE JE JE AS	JI FI HE AI HE J! JE AF SE OF HE DE JE FI	17 11
I HONTH-TO-HONTH LAUNCH SLIP ANALYSISS	20 ga (Garage	99 gas (
- ASCENT			200 gas 200 gas 200 gas
I SUPPORT TO DESIGN CHANGES (HARDMANE) I INTEGRATION SUPPORT)			
1 - ET DISPOSAL	01 01 01 01 01 01 01 01 01 01 01 01 01 0	-	
are and the	000 Oct.	an an	
	an de	an de-	
g. g.	41 41 41 41 41 41 41 41 41 41 41 41 41 4	(II) (II) (II) (II) (II) (II) (II) (II)	go 400 400 Pri
gas and	que des	a	
gay wat			
	, gas der		
	** des d	* gas 4	** doo 1
	90 Gas 6	90 gg (De gen (
··· des	204 Gan 204 Gan 204 Gan 204 Gan		Pr
		64 ga	(Ca gas
	der ger	60 ga	60 ga
		,	
	100 to 000 to 00	n (80)	
1 Motes:			
On the			
 Planned completion date - A = Actual completion date	tual completion date		

(_

3.3.2.2 ASCENT ABORTS		
	CY 1980 CY 1980 CY 1980 CY 1980 CY 1981 CY 198	1 CY 1982 1 1 71 HE & H 71 JT & ST OF BY D
PROCRAM WILESTONES	a -	
	1 43-2 1 513-3	
STS-2 THRU STS-4 ASCENT PERFORMANCE!		000 (000) 000 (000)
GACUIDMULES AND CONSTRAINTS 1 AMALTSIS AND DEFINITION 1	20 ga	20 mg (20)
- ASCENT ABORTS		
- Seb Separation		200
- ET SEPARATION	-	
- SKB DISPOSAL		
- ET DISPOSAL		
STS-2 OFP ASCENT ABONT PROFILE		
- ASCENT ABORT	00 00 00 00 00 00 00 00 00 00 00 00 00	
- STB SEPARATION	00 00 00 00 00 00 00 00 00 00 00 00 00	n
- ET SEPARATION	200 Cha c	
- SBB DISPOSAL	00 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
TYSCLICI 13	20 CO	
- SRB/ET RANGE SAFETY	20	pr 600 1
- 630207		

lanned completion date - A a Actual completion date

1 3.3 FLIGHT DESIGN	STS 2-4 PRODUCTS AND SCHEDULES
1 3.3.2.2 ASCENT ABORTS (CONTINUED) I	1 CT 1961
	SI OF RIDE JI FI HE AF HE
1 SUPPORT FOR STS-3 AND STS-4 1 CONCEPTUAL PLICAT PROFILES	
STS-3 OFP ASCENT PROFILE	
- ASCENT ABONTS	
- SAB SEPARATION	
1 - ET SEPARATION	
TESOSAL - SRB LISPOSAL	
ET DISPOSAL	
1 - SMB/ET RANGE SAFETY	
- ASCENT	
1 STS-4 OFP ASCENT ABORTS PROFILE	
- ASCENT ABORTS	
- SAB SEPARATION	
F - ET SEPARATION	
- SHB DISPOSAL	
i - ET DISPOSAL	
- SPB/ET NANCE SAFETT	
i - ASCENT	
Hoten:	
1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 -	المراق مراق المراق المر

1 3.3 FLIGHT DESIGN	StS 2-4 PM	STS 2-4 PRODUCTS AND SCHEDULES	
1 3 3.2.2 ASCENT ABONTS (CONCLUDED)			CT 1982
	I 31 FI WI AI HI 31 SI AI SI OI HI DI 31 FI NI A	I JI PI NI AI HI JI JI AI SI OI MI DI	JI FI WI AI WI JI JI AI SI OF UP DI
SISTIANA TIUS HONDAU HINOH-CI-HINOM I			
- ASCENT			
1 SUPPORT TO DESIGN CLANGES (HARDMANE) 1 INTEGRATION SUPPORT)	- 64 ga 44 ga 44 ga 45 ga.	. din din .	
i - ET DISPOSAL			94 des d
an d	a		po del
	der der der		
			6n a
	200		10 GH
			an C
-		P	10 gan (
•			74 da
no (201	a din		
•••	gas del	ger (Cr.	ga Gr
i.			
•••			04 (04 04 (04
10 6 01	- de		en (
en en	gr. dr.		in die
1 ga r (0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	e. e	
D1 &1	100 and 100 an	M dan	1 de :
	an a	en e	64 GH
in Chris			, do 4
44 an			
f Motes:			
. 00-			

F = Flanged completion date - A : Actual completion date	ctual completion date		

FOR STS-2 THROUGH STS-4	CX 1980 I J FP HI AF HI JI JI AF SE OF WED E JI FP HE AF HI JI JE AF SE OF KE DE	CY 1982 31 PI HI AI HI 31 31 31 01 HI
STS-2 (0STA-1)	·· ω	
STS-3 (PDRS)	CPP OFP OFP 9/1 PLICHT	
STS-4 (089-1)	CFP CFP 12/	12/1 PLICHT ! !
A - BASELINE GROUNDRULES AND CONSTRAINTS B - SUPER TAPE AVAILABLE C - NOWINAL I-LOADS COPPLETE D - SINULATOR DATA AND MCC ICD PRODUCTS E - DOCUMENTATION COPPLETE I	STRAINTS -	
Notes:		

1 3.3 FLIGHT DESIGN	-	PRINCE OF STREET	94 LN	
i i 3.3.3 ONORBIT		SIS C-4 ENDOORS BIND SCIE	2	
i 3.3.3.1 TRAJECTORI AND ATTITUDE/	CY 1980	CY 198		CY 1982
POINTING	I JI PI MI AI MI JI JI AI SI OI NI D	JI FI MI AI MI JI JI	At St Of Mt Dt J	JI PI MI AI MI JI JI AI SI OI NI DI
PROGRAM MILESTONES		g d	P P P STS-18	
GROUNDRULES AND CONSTRAINTS FOR STS-2	. See see see .			
STS-2 PROFILE SUPMARY	On On O		, e	
I STS-2 OPERATIONAL FLIGHT PROFILE	- -			pr
1 - ONORBIT	an dan d			
- TRAJECTORY				
- ATTITUDE AND POINTING	0.			
STS-3 CONCEPTUAL PLIGHT PROFILE	Δ.			
GROUNDRULES AND CONSTRAINTS 1 DOCUMENT FOR STS-3			•	a 0 00 as 0
I STS-3 PROFILE SUPLARY	Cu	D.	** *** *	
1 STS-3 OPERATIONAL PLIGHT PROPILE		- -		
. ONORBIT	20 page 0 20 page 20 2			··· ess •
: - TRAJECTORY	**************************************	* **		
- ATTITUDE AND POINTING	Da (gas 1
1 STS-4 CONCEPTUAL PLIGHT PROFILE	ρ			
.				po ga con
i Kotes:				
n or o				
•				

1 3.3 PLICHT DESICH	14 T C S L S C S C S C S C S C S C S C S C S	STS 2.4 PROBUCTS AND SCHEDULES		
3.3.5 ONORBIT		MUNICIPAL CAMPAINS	İ	
1 3.3.3.1 TRAJECTORY AND ATTITUDE/	CT 1980 1 1 P M A	CY 1981 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5)82 J! A! S! O! N! D!
GROUNDINGES AND CONSTRAINTS DOCUMENT FOR STS4			.l	
STS-4 PROPILE SUPPLANT				
STS-4 OPERATIONAL PLICHT PROFILE				
1 - 0404BIT				1 04 04
- TRAJECTORY				• == =
- ATTITUDE AND POINTING PLUME INCINCIPART FIR SUPPORT (STS-4)		- gas con (·
	00 000 000 000 000 000 000 000 000 000	no des de		pe tro que i
	on go on	200 Que Con		
				a. =-
	00 00 00 00 00 00 00 00 00 00 00 00 00			en en en
10 ton gan	. We go			
64 54		00 gas	••• •••	
80 80 1		·	-	2 -1 g ₂₀ (
	00 00 00 00 00 00 00 00 00 00 00 00 00			
	**		• •• ••	* **
Motes:				
			,	

3.3 PLIGHT DESIGN	STS 2-4 PRODUCTS AND SCHEDULES
1 3.3 3 ONOFBIT	CX 1980 CX 1981 CX 1982
1 3.3.3.2 PAYLOAD HANDLING	AI SI OI MI DI JI PI MI AI MI
GENOUMBRULES AND CONSTRAINTS I AMALYSIS AND DEFINITION	4
i - P/L BUBCTION SYSTEMS	
PAYLOAD EJECTION SYSTEMS ANALYSIS ! FOR OFF (RMS)	
SUPPORT FOR STS-3 AND STS-4 I CONCEPTUAL FLICHT PROFILE	
	6.
STS-2 THROUGH STS-4 FAS AUTO	a
I PAS P/L HANDLING ANALISIS	G. G.
CONCEPTUAL PLIGHT PROFILE (RMS)	STS-3 P
I OPERATIONAL PLICKI PROFILE (RMS)	14 Can
S28.	STS-2 P ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !
- CONTINGENCY AND	STS-2 P 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Notes:	

1 3.3 FLIGHT DESIGN			STS 2-4 PRODUCTS AND SCHEDULES	SCHEDULES			
1 3.3.4 DESCENT/GRTLS							
	I JI PI HI AI HI JI JI AI	NI SI OI NI D I JI PI MI	JI PI HI AI MI JI JI AI	SI OI HI	DI JI PI MI AI	AI HI JI JI AI	SI OI III D
PROGRAM MILESTONES	1 1	-	- a	a.			
			1 STS-2 I	STS-3	STS-4	·	
1 3.3.4.1 STS 2-4 DEORGIT TARGETING 1		•		•			_
1 3.3.4.2 STS-2 GROUNDRULES AND 1 CONSTRAINTS ANALYSIS AND 1		** qua det a	90 gan (Br) n	» ga &» c		·	
- GENERAL							
an and transcription that							
MISSION						•	
: - MANBUVER ANALYSIS		.					
1 - OTT DEVELOPMENT FOR GRILS	-						
STS-2 OFP DESCENT PROFILE		Coo (-	·		
1 - BID-OF-MISSION (NEAR TERM MAX 1 TEMPLATE)		- -	p, 44 g,				
! - GRTLS (NEAR TERM MAX TEMPLATE) !				44 ga 1			
I - CONTINCENCY ABORT ENTRY (MEAN I TRIM MAX TEMPLATE)		- -				- ga 64	
I I STS-2 OFP DESCENT PROFILE ALTERNATE! I AOA TO EDWARDS		- -					
	en	·	e				
P1 000 000	Pr gu gr					90 ga 80	
Notes:							
 				-			a. e. e

13.3	13.3 FLICHT DESIGN	STS 2-4 PRODUCTS AND SCHEDULES	
17 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	1 3.3.4 DESCENT/GRILS (CONTINUED) 1	1 CY 1981 E	
MALTESTS AND DEFINITION - ATTOLAND GUIDANCE FOR EMD-CF HISSION STS-3 GROUDSWILES AND CONSTRAINTS - ATTOLAND GUIDANCE POR GRILS STS-3 GOVERNALISS - ANTOLAND GUIDANCE POR GRILS STS-3 GOVERNALISS - EMD-CF-HISSION (MEAN TEMPORAL	FIMI AI MI JI JI AI SI OI NI DI JI PI MI AI MI JI JI AI SI OI MI DI JI PI MI	At St Ot Mt Di	
- GREENAL ANTOLAND GUIDANICE FOR END-OF- STS-3 GEOURDILLES AND CONSTRAINTS STS-3 GEOURDILLES AND CONSTRAINTS - MANCHYER MALLTSIS - ANTOLAND GUIDANIC FOR GITLS STS-3 GFT (REAN TEAN NIN TEAN-LIN) - GET (REAN LIN) - GE (REAN-LIN) - GE (REAN-LIN) - GET (REAN-LIN) - GE (REAN-LIN) - GE	1 STS-3 GROUNDPULES AND COMSTRAINTS 1 ANALYSIS AND DEPINITION	20	14 (SH GS) GS
STS-3 GOVERNILES AND CONSTRAINTS - MANGUER MALITISS - MATOLAND GUIDANCE POR GITLS - MATOLAND GUIDANCE POR GITLS - AUTOLAND GUIDANCE POR GUITANCE - AUTOLAND GUIDANCE POR G	- GENERAL		
STS-2 GROUPORULES AND CONSTRAINTS - MARCUTER AMALYSIS - AUTOLAND GULDAICE POR GRTLS STS-3 OF DESCENT PROFILE - EDD-CP-41 SCHOOL REALY TERM HIS	- AUTOLAND GUIDANCE FOR END-OF-		
- MANEUVER AMALTSIS - AUTOLAND GUIDANCE FOR GETLS STS-3 OFP DESCENT PROFILE - END-OF-HISSION (MEAN TERM MIN - END-OF-HISSION (MEAN TERM MIN - CONTINGENCY ABOUT BITTY (MEAN TEAM MIN TEPLATE) STS-4 CHOUNDHULES AND CONSTRAINTS AMALTSIS AND DEFINITION - GENERAL - ENTRY ALPRA PROFILE CHANGE - MANEUVER AMALTSIS Notes:	STS-3 GROUNDRULES AND CONSTRAINTS ! AMALTSIS AND DEPINITIN (CONCLUDED) !		
- AUTOLAND GUIDANCE POR GRTLS STS-3 OFF DESCENT PROFILE - END-OF-HISSION (MEAN TERM MIN TEMPLATE) - GRTLS (MEAN TERM MIN TEMPLATE) - GRTLS (MEAN TERM MIN TEMPLATE) - GRTLS (MEAN TEMM MIN TEMPLATE) - GRTLS (MEAN TEMPLATE	- MANEUVER ANALYSIS		
- END-OF-HISSION (MEAN TERM MIN TEMPLATE) - GRILS (MEAN TERM MIN TEMPLATE) - CONTINGENCY AND TEMPLATE) - CONTINGENCY AND TEMPLATE) - CONTINGENCY AND CONSTRAINTS - CONTINGENCY AND CONSTRAINTS - CONTINGENCY AND CONSTRAINTS - CONTINGENCY - ENTRY ALPHA PROFILE CHANGE - MANEUVER ANALYSIS Notes:	- AUTOLAND GULDANCE POR GRILS		
- CATLS (NEAR TERM MIN TEMPLATE) - CATLS (NEAR TERM MIN TEMPLATE) - CATLS (NEAR TERM MIN TEMPLATE) - CONTINCERICY ABORT BETRY (NEAR TEMP MIN TEMPLATE) STS.—A GROUNDINILES AND CONSTRAINTS AMALYSIS AND DEFINITION - GENERAL - BETRY ALPHA PROFILE CHANGE - MANEUVER ANALYSIS NOTES:	STS-3 OPP DESCENT PROFILE		
- CRTLS (NEAR TENH HID TENELATE) - CONTINGENCY ADOLT BOTH (NEAR) STS-4 GROUNDRULES AND CONSTRAINTS AMALIYSIS AND DEFINITION - GRIERAL. - ENTRY ALPEA PROFILE CHANGE - MANEUVER ANALYSIS Wotes:	1 - END-OF-MISSION (NEAN TERM MIN 1		
- CONTINGENCY ADORT BATRY (FEAR I TERM MIN TERMINES AND CONSTRAINTS I GROUNDINGLES AND DEFINITION CONSTRAINTS I GROUNDINGLES AND DEFINITION ALPIA PROFILE CHANGE I GRANGE I GR			
AMALYSIS AND DETNITION - GRIERAL - BITRY ALPHA PROFILE CHANGE - MANEUVER ANALYSIS Notes:			
- GENERAL - ENTRY ALPEA PROFILE CHANGE	STS-4 GROUNDRULES AND CONSTRAINTS !		
- MANEUVER ANALYSIS - MANE	- CENERAL		
Motes:	1 - ENTRY ALPHA PROFILE CHANGE		
**Cres:	- MANEUVER ANALTSIS		,
	Motes:		

1 3.3 PLICHT DESIGN	21 to 2	STS 2-4 PRODUCTS AND SCHEDULES	
1 3.3.4 DESCENT/GRALS (CONCLADED)	086	CT 1981	i CT 1982
	A! S! O! H! D ! J!	FI HI AI HI JI JI AI SI OI NI DI	J1 F1 M A1 M
: STS-A ENTRY CONCRETUAL PROFILE FOR I THERMAL ASSESSMENT			
STS-4 OFF DESCENT PROFILE			
- END-OF-HISSION (WEAR TERN MAX I TERM MAX	or gas don .		
STS-4 OFF DESCRIT PROFILE (CONCLUDED)		» « « « «	
I - GRTLS (MEAR TERM HIN TEMPLATE) I	20		
- CONTINGENCY ABORT SHIRT (HEAR TERM NIM TEMPLATE)			
NONTH-TO-MONTH RECOMPTIONATION AMALESTS		n	
OPT ENTRY PLANNING ASSESSMENT	00 and a		
			* as as as
•••••			
	M	77 gas 470 gas (1	
Notes:			
			

3.3 FLIGHT DESTGN	STS 2-4 PRO	2-4 PRODUCTS AND SCHEDULES	55	
3.3.5 HON-PROPULSIVE CONSUMABLES !	CY 1980	CY 1981	-	28. 13
	A! S! O! M! D ! J! F! N! A!	A! S! OF	HI DI JI FI M	At Ht 3
PROGRAM MILESTONES		1 - 4 1 - 4 15-2 1 - 515-3	5	
STS-2 GROUNDRULES AND CONSTRAINTS I				
- DIO INTEGRATION	-	014 Gay		D 1 D 1
- P.A. INTEGRATION				
- ORBITER/OSTA ATCS THEIRIAL ANALYSIS		per dan dan 1		De des des l
STS-2 OPERATICHAL FLIGHT PROFILE !		De Ger Ger .		po des des
STS-3 CONCEPTUAL FLIGHT PROFILE 1		(See (See (
STS-3 CROUNDRULES AND CONSTRAINTS !		50		De des gas :
- DTO INTEGRATION 1			·	3 . 3 . (
STS-3 OPERATIONAL FLIGHT PROFILE I CONSUMBLES		- -		De De De
STS-4 CONCEPTUAL FLIGHT PROFILE !		ga din (
STS-A GROUPDRULES AND CONSTRAINTS I	200	ma 600 (pag)	De 600 De 1	THE STA STATE OF
- DTO INTEGRATION	per gas (
- P/L INTEGRATION 1	90 ga. And 90 ga. 90 ga			200 E00 E00
Motes:				

72

3.3.5 WON-PROPULSIVE CONSUMBLESS ST3-1 OFFICIAL PLICAT PROPILE CHASSIMALIZA CHASSIM	3.3 FLIGHT DESIGN	m 60 1	STS 2-4 PRODUCTS AND SCHEDULES	
DBLES WERATIONAL PLIGHT PROPILE BBLES	3.3.5 NON-PROPULSIVE CONSUMABLES	1980	CY 1981	CY 1982
Ourspandless Constandless Const		E	JI PI MI AI MI JI JI AI	HI AI MI
	STS-4 OPERATIONAL PLIGHT PROFILE CONSUMABLES	. On on the set of		
		an a	on on the gas gas g	10 Mar (04 (04 (04 (04 (04 (04 (04 (04 (04 (04
		20	20	, 14 GO
		an an an an an		
			pa. Err gas err en gas err gas gar en gas err gas err en	an am gu din da an am gu din an an am gu din an
		** ** ** ** **	On on the car of	
lotes:		20		** die
	lotes:			

93.3 PLIGHT DESIGN	De Ge 4	573 2-	sts 2-4 products and schedules	SEDULES.			
1 3.3.6 OHS/RCS CONSUMBILES	CY 1980		CT 1981		៩	CT 1982	1
	12	St OI HID I JI FI MI	AI MI JE JE AI	SI OF BE DE JE PE	E A E	JI JI VI SI OI BI DI	<u> </u>
PROGRAM MILESTONES	a			- 6	- 0.		
STS-2 THROUGH STS-4 GROUNDHULES AMP. CHUSTAINTS AMAI VSTS AMD		M 44 ps 4	 } ;	•			
DEPTHINGS	I (DETAILS AND SCHEI	SCHEDULES THE BY PACE			T		
STS-2 OPERATIONAL PLICHE PROFILE CONSUMBLES	70 Ga Ga (" en en e				
STS-3 CONCEPTUAL PLICAR PROFILE - CHS/RCS	000 ggg (an an en (des des (
STS-3 OPEFATIONAL PLICHE PROFILE CONSUMMERES	int ma	Pr des des (, 		
STS-4 CONCRETUAL PLICATION - DISCRET	1 nn 60 an 1		,, en en en e		p	no 600 gas (
STS-4 OPERATIONAL PLICHT PROPILE CONSTRABLES	no en			·	H do es (n en en <i>i</i>	
		·					
	10 GEO GEO 10 GEO GEO 10 GEO GEO 10 GEO GEO						
- Potes:	5-1 5-1	-			•	-	- 1
P = Planned completion date - A = 1	Actual completion date						•

1 3.3 FLICHT DESIGN	STS 2-4 PRODUCTS AND SCHENULES	
1 3.3.7 NAVIGATION	1 1961 ID 1 1961 ID 1	CI 1982
	I JI PI MI AI MI JI JI AI SI OI NI DI JI PI MI AI MI JI JI AI SI OI MI DI JI PI	HI AI MI JI JI A! S! OF H! D
PROCRAH MILESTONES	P P P P P P P P P P P P P P P P P P P	ne de de
I NAVIGATION SUPPORT POR STS-2 OFP		000 000 0
1 - MCC ICD PRODUCTS	200 and 400 an	pri gas d
- 0/B I-LOADS	200	
I NAVIGATION SUPPORT POR STS-3 OFP		
- HCC ICD PRODUCTS	Ch	
- 0/B I-LOADS	6	
HAVIGATION SUPPORT FOR STS-4 OFP		
- MCC ICD PRODUCTS		
SUVOT-1 8/0 - i		
14 mar 1	. ga	
.	200 gas (no san d
		
dan dan		
•••		***
		. On .
		ga
na Sine -	* gas (
	-	
Notes:		
• ••••		
pr 454		
•••		

1.4.1 6.100F 1.00F 1.0	1 3.4 PLIGHT OPERATIONS SUPPORT	d tr-5 515	STS 2-4 PRODUCTS AND SCHEDULES	
Give a a factor date.	1 3.4.1 FLIGHT TECHNIQUES		1801 50	T TORS
Galler - A & Actual compression date	1 3.4.1.1 ASCENT/ABOFTS	MI JI JI WI S! C! N! D!		AI HI JI JI AI SI C.
T. Cake - A = Actual comp. ef. Lond.	I PROGRAM MILESTONES	a	o- û.	an
### SEPARTICAL		1 STS-3		
SECULT ACTION TYPE SECULT ACTION TYPE MOOTH ACTION TYPE WOLES: WOLES: **P	ASCENT		9 des 1	·· an ·
STR SEPARTICAL STR SEPARTICAL STR SEPARTICAL STR SEPARTICAL STR SEPARTICAL ASSERT ABORTS ABORT ACTION ITUBES WOLKERS:	ASCENT ACTION ITEMS		an dan dan dan dan dan dan dan dan dan d	
SPE DISPOSAL ET DISPOSAL ASSOCIAT ADORTS ABOUT ACTION ITUBES NOCARS:	I SAB SEPAPATION			
SPE DISPOSAL ET DISPOSAL ASSUMPT ACTION ITBMS Modes: Notes:	ET SEPARATION		- 4	
ADORT ACTION ITEMS ADORT ACTION TEMS ADORT ACTION TO THE STATE OF TH	1 SPB DISPOSAL		a d	0-1 0-1 0-1 0-1
ABORT ACTION ITTENS ABORT ACTION ITTENS Woden:	I ET DISPOSAL		a d	en en
Notes:	I ASCIBIT ABORTS	20	600 des	
Motes:	! ABONT ACTION ITEMS			
Motes:	•			
Motes:	•••		an a	
Notes:		10 gas	7 Gas	
Notes:	**			(0) (0) (0) (0) (0) (0) (0) (0) (0) (0)
Notes:	•••		, de ,	
Notes: ** Proposition date**	Ph Spar	00 000 000 000 000 000 000 000 000 000		6 -4
Notes:	•••••••••••••••••••••••••••••••••••••			30 (
Notes:	er c on		P1 400	Pr gu
Notes:	9 1 •			
Notes:	,, ,, ,,	pr	pp 64	D. O.
Notes: Notes:	20.			
F = Planned complet. 3r date - A = Actual completion date				-
F = Pinned completing date - A = Actual completion date				.
F = Planned complet. In date - A = Actual completion date	-·· •) ((a)
F = Planned completion date - A = Actual completion date	- su			6. C.
F # Pashard completer A # Actual completion date	• •			
	F a Plenned complet, or date - A a	Actual commietion date		

3.4 PLIGHT OPERATIONS SUPPORT 3.4.1 FLIGHT TECHNIQUES	8	STS 2-4 PRODUCTS AND SCHEDULES	
3.4.1.2 ONORBIT	CT 1980 1	CT 1981 1	CT 1982
3.4.1.2.1 ATTITUDE AND POINTING 1	i Si Oi Hi D i Ji	FIMIALMIJIAISIOLNIDI	U IN AT MI JE JE AT ST OF
PROGRAH MILESTONES	G-1		en en
	-	15TS-2 1 5TS-3 5TS-1	
ACTION ITEMS			
ATTITUDE DISPLAYS POR THEMMAL	a a a a a a a a a a a a a a a a a a a		
ALTSIS			
COMMUNICATIONS TIMELINES		- C	
Notes:			•

13.4 PLICHT OPENATIONS SUPPORT		STS 2-4 PRODUTS AND SCHEDBLES	
1 3.4.1 PLICHT TECHNIQUES		1 1981	CT 1982
3.1.1.5	JI PI MI AI MI JI JI AI SI OL I	I D I JI FI NI AI WI JI JI AI SI OI N	
1 3.4.1.2.2 ONS MAREUVERS		n de (
1 PROGRAM MILESTONES		1 1513-2 1 513-3	7.55
ACTION ITEMS	(PRODUCTS TRE BY PIR(1)		
ne go go	. do go do go		
· gu da		600 GO 1	00 ga (
-		*** *** **	
gu 94		de de l	en en e
		00 an 0	
•			n ga Gr
.		* ga	· as as
pr 600 f		· ga, av	
			an an
	ga. ga.	an a	an an
		64 GH 64 GH 65 GH 65 GH	60 FF
	. gas dis	, ga da	61 GB
l Notes:			
a. a. a			
F - Planned completion date - A = Actual completion date	Actual completion date		

3.4.1 FLIGHT TECHNIQUES	010	SIS 2-4 PRODUCIS AND SCHEDULES	
3.4.1.2 ONORBIT !	CY 1980	CY 1981	
2 H 2 2 BMS	JI FI MI AI MI JI JI AI SI OI NI DI JI PI MI	AI MI JI JI AI S! OI NI DI JI	FI MI AI MI JI JI AI SI OI NI DI
DESCRIPTION MIT POTONDO		0	
Carolicanti rencon		1815-2 1 815-3 ST	11 G04 gam
CTION ITEMS		ā.	
PLUME IMPINGEMENT FTR SUPPORT (STS-4)			
Notes:			

1 3.4 FLIGHT OPERATIONS SUPPORT	-		
1 3.4. FLIGHT TECHNIQUES		STS 2-4 PRODUCTS AND SCHEDULES	
1 3.4.1.2 CHORBIT	CY 1980	CX 1981	CY 1982
	A! S! O! M! D	I J! FI MI AI MI JI J! A! S! O! M! DI J! F!	ii ii ii
3. 4. 1. 2. 4 PAYLOAD EJECTION		gas 64	
PROGRAM MILESTONES		Q.	
		15TS-2 1 STS-3 STS-4	en en en
1 ACTION ITEMS			
***	20 P		gin wei
• •••	10 gan (* gas 1	
 •			p4 gp4
			01 0 01 0
*	pr	pr	ne me
. •••			
	m	or don	and dates
800 900	Gr. Gr.		gen den
• •• •			
	· 604		
-	ga	gas Gen Gas Gen Gas Gen	
	des de		0-1 to 0-1
	· mo. (
n (50)	ne gas	20 gas -	on (866)
.	gas des		gs
· •			· · · ·
··· •··	ps det	me 600	Die Ger Die Ger
500 600	gas den gas den gas den	Çiri gun	Chi ga
1 Notes:			
en e			D1 6
n gas u			n en 1
			PF gas 6
1 - B			

3.4 PLIGHT OPENATIONS SUPPORT 3.4.1 PLIGHT TECHNIQUES 3.4.1.3.1 DEORBIT PROGRAM MILESTONES ACTION ITENS Motea:
--

81

3.4 FLIGHT OPERATIONS SUPPORT		STS 2-4 PRODUCTS AND SCHEDULES	85		
12 20 20 20 E. T. T. Y.	1 1980 I	CY 1981	- -	CI 1982	
	AI SI OI MI DI	A! S! O!	M! Di J! F! M!	A! M! J! J! A!	St 0! N!
3.4.1.2.2 ENTRY/LAND/NG/GRTLS	en en	(m) (m)			ps D -1
PROGRAM MILZSTONES		d	=		
	der ge	1575-2 1 573-3 1		 -	. .
STS-2					,
- UPDATE TECHNIQUES FOR OTT	Che and a second				
- POST BLACKOUT MAREVER I CAPABILITY	-	ng die des 1	n	m en en 1	
- UPDATE DELTA STATE U/D CRIT	00 mm 1	Pr gas 1		· • ·	
- MONITOR TECHNIQUES FOR ATTITUDE: HANEUVER					 .
- TECHNIQUE REVISION USING PLICHT!	an an an .	a a			_ • • • •
27 S- 3	904 may 4	P* Ga		•	
- UPDATE TECHNIQUES USING PLICHT ! TEST DATA			m da de e	· • • • • •	
- AUTOLAND MCMITORING IECHNIQUES			, .		 •- •
##************************************	20 CO V				. .
- UPDATE TECHNIQUE POR REVISED !		Charles on the charles of the charle		u de au _s e	
- UPDATE TECHNIQUE USING FLIGHT 1 TEST DATA					p. 01 00
	45 AT	gas - CO			
Moteu:					

P = Planned completion date - A = Actual completion date

3.4.1 P.1.007 TECHISCOSS 3.4.1 T. CONSUMBLES 1. 1.1.1 CONSUMBLES 1. 1	1 PLIGHT TECHNIQUES		SIS 6-4 FINDOUS MIN COMPANIES	
PH M JI JI AI SI OI BI DI JI PH M M MI JI JI AI BI DI JI PH MA MI JI JI AI MI JI AI MI JI JI AI MI JI		980	CT 1981	
STAMELESS (FRODUCTS TISS ST PRZ) (FROUCTS TISS ST PRZ) (1.4 CONSUMABLES MANAGEMENT	F! M! A! MI J! J! A! S! O! M! D ! J!	MI AI MI JI JI AI S! OI N! DI	HI AI HI JI JI AI
(PRODUCTS TES BT PRZ)	RAM MILESTONES		G 45	
(PRODUCTS TRS BT PR2)				
(PRODUCTS TAS BY PR2)	PROPULSIVE CONSUMABLES			er er
(PRODUCTS TAS BY (PRODU	ACTION ITEMS		2	-
	00 14175100000 0000	2 2		
	ICS CONSUMBLES	1		,
			-	
			-	
		-		
			-	
		-		
	•			
				-
			-	-
				-
				-
		-		-
			-	
				gas (
				-
		1 1 1		

3.4.1 FLIGHT TECHNIQUES 3.4.1.5 NAVIGATION PROGRAM WILESTONES ONDORIT ACTION ITEMS - ACTION ITEMS	
TTENS TT	1981
TTENS SECTION AND ADDRESS OF THE SECTION ADDRESS OF	AI SI OF HI DI JI PI HI A! HI
TTENS TT	Į.
BIT ACTION ITENS BIT ACTION ITENS BIT ACTION ITENS ON	212-3 ST8-1 1
BIT ACTION ITENS WITDESCENT ON ITENS ON ITE	
WITERS ON ITERS ON IT	
WI/DESCENT ON ITEMS O	
HCC ASCENT/DESCENT - ACTION ITENS - ACTION I	2- 2-
- ACTION ITENS - ACTI	
- ACTION TTRINS - ACTION TIRES - MODES:	
- ACTION ITENS 20	
	me dan
	10 Gen (
	no
	an an an
	10 gan 1
Wotes:	
Wotes:	
Notes:	10 CO (
Notes:	24 Cu
_	

SMITTING CAN MOTTA RIME SEATTHE			
SUPPORT (CONTINUED)	CX 1980		CY 1982
3.4.2.2 OWORBIT	I JI FI HI AI HI JI JI AI SI OI KI DI JI FI HI	Ī	E F
PROGRAM MILESTONES		id d d d	04 de
3.4.2.2.1 ATTITUDE AND POINTING			, gas das u
- 0/B ATTITUDE AND POINTING			
- MCC ATTITUDE AND POINTING			go. 1
3.4.2.2.2 OMS MANEUVERS			P4 gps &
- 0/B GUIDANCE AND TARGETING	m ga t		
- MCC MANEUVER SUPPORT			94 9 4 9
3.4.2.2.3 PL EJECTION	100 day 4	o. ·	D4 404 4
- P/L EJECTION SUPPORT		- a	
		. Can can Chi	
Notes:			

SUPPORT (CONTINUED)	CT 1980		CT 1982
3.4.2.3 DESCENT		M A M SI	7 M Al M 31 J1 A1 S1 Of M
PROGRAM MILESTONES		1515-2 515-3 515-1	
GRILS GUIDANCE AND TARGETING	100 de 10		
DESCRIT GUIDANCE AND TARGETING		G.	
DECRETT GUIDANCE AND TANGETING		-	
		• en •	
	100 gar -		
	27 04 05 05 05 05 05 05 05 05 05 05 05 05 05		
	20 au		
	400 au		
	m 600 (
		ma ma	
	000 000 000 000 000 000		
es.			

3. h. 2. h. COM SUMMARINES. HARAGORBERT 3. F. F. H. A. F.	3.4 FLIGHT OPERATIONS SUPPORT	STS 2-4 PRODUCTS AND SCHEDULES	
	SUPPORT (CONTINUED)		CT 1982
	3. 4. 2. 4 CONSUMARGES MANAGEMENT	JI JI BI SI OI HI D I JI FI MI BI HE JI JI BI SI OI MI	M AI
	PROGRAM MILESTONES	- 6-	
TO SHEET. THE COMPANY COUNTY CONTRACTOR IN THE PROPERTY OF THE PROPERTY CONTRACTOR IN COMPANY CONTRACTOR IN CONTR		1 - 1	no des s
POLICES TOURISM TOUR HAME-TONE HAME-	in the page.		
MEANING WANTA SERVICE NOTICE OF THE PROPERTY	S-di		a. a.
M CORES M C	ST DE		
M ODNES	SOMPTGURATION MAKA-MARKET		
obess:	1 SDE/SI		
	- Bank		64 Ga
lotes:			
	otes:		

1 3.4 PLIGHT OPERATIONS SUPPORT 1 3.4.2 SIPOLATIONS AND REALTIME	STS 2-4 PRODUCTS AND SCHEDULES	
(SUPPORT (CONCLIDED)	1 1961 II I I I I I I I I I I I I I I I I I	
3.4.2.5 NAVIGATION	31 Pt Rt At Mt 31 Jt At	St 01 IN D
PROGRAM MILESTONES	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
1 HCC ASCENT/DESCENT MAY		
I MCC ONDIBIT MAY		
! O/B ASCENT/ONONDIT/DESCENT MAYIGATION		
en en		
		_ =
		
~		
.		
m		
ń go ś		
• 554 64		
. ga. mi (
Potes:		
1 6 01 6 04		
P . Planned manifelian date . A .	Actual completion date	

1 3.4 FLIGHT OPENATIONS SUPPORT					STS 2-4	PRODUCTS	STS 2-4 PRODUCTS AND SCHIDULES	DULES				
1 3.4.2 SISTEMS DESIGN SUPPORT		8	CI 1980				CT 1981				cr 1982	
	7 14 16		JI A! S!	9 11 0	31 71 16	¥	5	10		2	I JI VI	10 15
	. M	_		,								. .
		*				• •• •						
N •• 1				- ~* -						,		
							, e					. – .
· ·						• = •						
			. 🗢 e:	. 41 81		_						
• •• ••												
											.	
•• ••												
		 (·	en en ((-	
on die f		» «				- en -					.	×
n an av		• e. e.		- es es		* est 6*						·
											•• ••	
									•			
		• •	• 6 m des 4				, e -					
	-											
Pi on a												
· ·												

3.5 TOOL DEVELOPMENT	STS 2-4 PRODUCTS AND SCHEDULES	
3.5.1 INTEGRATED DIVISION TOOLS 3.5.1.1 SVDS	CY 1980 CY 1981 CY 1981 CY 1982 CY 1983 CY 1	CY 1982
PROGRAM MILESTONES	P P P P P P P P P P P P P P P P P P P	
ASCENT/ABORT/DEORETT SIMULATION		-
- PRELIMINARY ANALYSIS PILE		
- OF FILE		
- PROGRAM MAINTENANCE, MODS, AND USER SUPPORT		
- SDL COMPARISON TEST PILES	(TBS BY PNG)	
- SMS VERIFICATION SUPPORT	(THS BY PMG)	
- OFP REVISION FILE	(Tas Bir Prid)	
ASCENT SEPARATION SIMULATION		
- MAINTENANCE, HODS, USER SUPPORTI		
ORBITAL SIMULATION		
- 3 DOF	DOMENTE E	
- 6 DOF SIMULATION POR PLIGHT PLANNING		
- MAINTENANCE, MODS, USER SUPPORT		
Notes:		

3.5.1 INTEGRATED DIVISION TOOLS 3.5.1.1 SVDS (CONTINUED) DESCENT STS-2 - OFP - OFP - ECM	1801 72	
		CW 1982
- OFP - DOM	E	×
- OFP - OFP		
- OFP - 50M		
- OFP - 50M		
- OFP - OFFLS		
- CT - BOM		
- CT - GNTLS		
515-3		
- OFP EOM		
- OFP GATLS	-1	
- MILESTONE SUPPCRT		
- NAP BANKING		
- FDS PREPARATION		
SYSTEM AND POST PROCESSORS		
- MILESTONES		
- TABDIS MODS (TBS	(TBS BI FH6) ! ! ! ! ! !	
- TRWPLT MODS (TRK	(TBS BY PM6) I	
Notes:		-

P : Planned completion date - A : Actual completion date

できる。 「「「「「「」」」というできませんが、これできないという。 「「「」」というないできない。 これでしているとなっている。 これでしている。 これできませんにいった。 これできませんにいる。 これできません これできません これできる これできんできる これできる
The state with the

3.5.1.1 STOS (CONCLOMD) 3.5.1.1 STOS (CONCLOMD) 3.5.1.1 STOS (CONCLOMD) 3.5.1.1 STOS (CONCLOMD) 5.5.7 H A1 HI 31 ST H A1 HI	3.5 TOOL DEVELOPMENT	STS 2	STS 2-4 PRODUCTS AND SCHEDULES	
38 SUPPORT	.5.1 INTEGRATED DIVISION TOOLS !	1 near ya	T too w	1083
- SUPETIANE BINLIACORENTS - MAINTENANTCH, MODS, USBR SUPPROFIT - MAIN	1.5.1.1 SVDS (CONCLUDED)	AI MI JI JI AI SI OI NI DI JI	AI MI JI JI AI SI OI NI DI JI FI MI AI	JI JI AI SI
- MAUNTENANCE, MOS. USBR SUPPORT - MAUN	I CONC.D BOSE BUCK BOOK (CONC.D)	po the s		
- MAINTENANCE, NODS, USER SUPPORTI	- SUPERTAPE ENHANCEMENTS	- ~	An Col	ga, en.
Moteus :	- MAINTENANCE, MODS, USER SUPPORT!	-		
lokes:			10 mm	*****
Octors:	** an *	no des (MA gas s	
	٠ س		and ages	** ***
		50 mg		
	-			** ** ** *
	d 11 6 2		200 gas	. 4 1 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
	6 00 cos			
	. = 4			
	-	pr 40	 	
			and (M)	en 91

	10 004	000 appe 000 appe	70 au 70 au 70 au 70 au 71 au	** **
				~ .
lotes:				
iotes:			ga, au ga, au	gis 611
	otes:			

1 3.5 TOOL DEVELOPMENT	STS 2-4 PRODUCTS AND SCHEDULES
1 3.5.1 INTEGRATED DIVISION TOOLS	1 CT 1981
3.5.1.2 :755	AIS! CIMIS I JI PI MI AI MI JI JI AI SI SI NI DI JI P' MI AI M
PROGRAM MILESTONES	PI
	1 1 1212-3 STS-3 STS-3 I
HAINTENANCE, MOLE, USER SUPPORT	
 	
<u></u> -	
4 4. 5	
	20
···	
• •••	
<i></i>	
- . •.	
21 80	
1	
• =	
<u></u>	
1	
.	and don't do
w1 2 1	201 201 201 201 201 201 201 201 201 201
* Motor:	
sur det	
F = Flances completion date - A =	Actual completion date

3.5 TOOL DEVELOPMENT		STS 2-4 PRODUCTS AND SCHEDULES	S
3.5.2 ASCPRT/ABO3TS	i CY 1980	CT 1981	! ! CT 1982
	I JI PI MI AI MI JI JI AI SI OI BI D !	JI PI MI AI MI JI JI AI SI OI MI	DI JI PI MI AI MI
PROGRAM MILESTONES			pa dan (
	ga	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
SVINS RECUIREMENT AND VERIFICATION			
BENCH PROGRAMS MAINT AND MODS			1 gas 0
- NE CHANGES	On		0 ga tr
OPPLINE MAINT AND MODS	24 Ga 1		
		ga ga ga an	
Motes:			
P = Planned completion date - A =	r Actual completion date		

3.5 TOOL DEVELOPHENT	STS 2-4 PRODUCTS AND SCHEDULES	
3.5.3 ONORBIT	AGAL WAY	
3.5.3.1 ATTITUDE AND POINTING	JI PI HI AI HI JI JI AI SI OI NI D I JI PI MI AI MI JI JI AI SI OI NI	I DI JI PI MI AI MI JI JI AI SI
PROGRAM MILESTONES	a. a.	- G
	1 213-2 513-3	STS-
SVDS REQUIREMENT AND VERIFICATION		
- MAINTENANCE AND MODS		
BENCH PROGRAMS		
- MAINTENANCE AND MODS		
- VIEW		
- ARM		
- ANTENNA FOV		
- FLT PLAN SU-MARY		
OFFLINE		
- MAINTENANCE AND MODS		
- OKBITAL ATTITUDE GRAPHICS (HP)		
		• co
Notes:		

3.5 TOOL DEVELOPHENT	THE PERSONNEL AND PROPERTY OF THE PERSONNEL
1 3.5.3 CHORBIT (CONTINUED)	SIS C-4 PRODUCTS AND SCREDULES
1 3.5.3.2 ONORBIT ONS MANEUVER	CY 1980 1 CY 1981 1 CY 1982
	ा गाम ता भागा जा जा जा जा जा जा जा जा जा भाग जा जा जा डा ला मा जा जा भा जा जा जा जा डा ला डा जा
I SVIS REQUIREMENT AND VERIFICATION I (CONTINUED)	
1 - (TBS BY FM 41)	
BENCH PROGRAMS	20
1 - (TBS FY FA81)	20
OFFLINE PROGRIMS	
- (185 84 F F F F F F F F F F F F F F F F F F	
Notes:	
P = Planned completion date - A =	Actual completion date

3.5.3.3 RMS 1 JI F RMS SIM VALIDATION 1 PDRS MAINTENANCE AND ENHANCEMENT 1 HP 9835 DEVELCPHENT, MAINT, AND 1 ENHANCEMENT	CX 1980		H H	1981 1 Ai Si Oi		CX 1982 CX 1982 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
	H H H H H H H H H H H H H H H H H H H		W W W W W W W W W W W W W W W W W W W			1 1	
DRS MAINTENANCE AND ENHANCEMENT IN 9835 DEVELCPHENT, MAINT, AND INHANCEMENT		A				يور همه هم	gg gar gar gar dan gar gar gar gar gar gar dan gar dan gar dan gar dan gar
PDRS MAINTENANCE AND ENHANCEMENT I IP 9835 DEVELCPMENT, MAINT, AND INHANCEMENT						وية هذا ويد	an ar do su go ar go ar go de de de de de de de de
P 9835 DEVELCPMENT, MAINT, AND INHANCEMENT							ON
INHAN CEMENT						, and the goal fire goal that and the goal the goal the c	
		* das der am der der der der der der der der				n gas den gas den som Den uns den en den :	. ga an ga Di do do ga Si sa Si do do
							n ga St
	en en en en en en en						Digo de ga Di es Di de .
-	000 gas mas que con	00 ga me 04 00 .					
					_	. 	.
							64 au :
•••	_				•••		, .
	- 			en en	** **		
, 20 0				. - -			-
• •• •				• • •			
- 						· .	
	,		=	,	
		. .					
<u>.</u>		e. =					
• •••	• •	• •••		• == 1	• •	• •••	-
	-			-	-	-	-
Notes:							
P = Planned completion data - A = Actual	= Actual completion date						

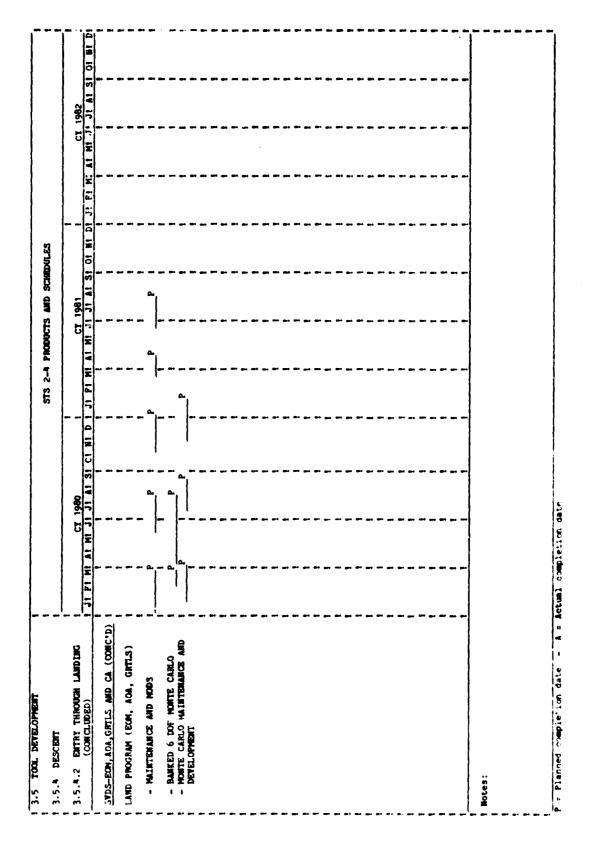
The second second control of the second seco

(,

13.5 TOL DEVELOPMENT			
3.5.4 DESCENT	STS 2-4	STS 2-4 PRODUCTS AND SCHEDULES	
} ! 3.5.4.1 DEORBIT	1 1980	C7 1981	560 55
	I JI PI MI AI MI JI JI AI SI OI NI D I JI PI MI AI MI JI JI AI	A! H! J! J! A! S! O! B! D!	JI PI HI AI HI JI JI AI SI OI HE D
PROGRAM MILESTONES		04	
		STS-2 STS-3	272-4
I SVDS REQUIREMENT AND VERIFICATION			• con (
i - (PRODUCTS TBS FM41)	m		
BENCH PROGRAM		en en	
! - (PRODUCTS TBS ?H41)	01 ga 01 ga	<u></u>	de go
OFFLINE PROGRAMS	20 gar 20 gar 20 gar 20 gar		
! - (PRODUCTS TBS ?M41)			600 card
-			
		• ••	* as
			e .
	,		, co
· · · · · · · · · · · · · · · · · · ·			
··· •			
·· ··			
· ·			
w m,	p. 0		gu du
•••	an 1		a gas :
		B1 g1	(0) (p)
		e •	en e
		-	• -
	-		1
! Notes:			
·* ·			
Set 5			
P = Planned completion date = A =	= Actum completion date		
•	page meantage through		

1 3.5 TOOL DEVELOPMENT 1 3.5.4 DESCENT		STS 2-4 PRODUC	STS 2-4 PRODUCTS AND SCHEDULES		
1 3.5.4.2 ENTRY THROUGH LANDING	21 1980		CY 1981	365	2
	I JI PI HI AI MI JI JI AI SI OI HI	D I JI PI MI AI ME	At St Of HI	DI JI FI HI AI HI JI JI J	A! S! O! #! D
PROGRAM MILESTONES			- 0	- a. b	 -
SVDS - BOM, AOA, GRTLS AND CA	. Got gan				. ~ ~
1 513-2				gen gen :	
- OTT MODEL AND GNC UPDATE	· - ° -	·			-
- PII, ASI POHU MODEL UPDATE	} } 	**	== e== :	, , , , , , , , , , , , , , , , , , ,	·
: - INCORPORATE NAV. PC I-LOAD ! UPDATE				20 ga ga 21 ga 21	
- INTEGRATE MODIT, CHANGES		ga ga			
575-3				an an	
- MODIFY NAV/FC CONTROL MODELS			gas das ,		 -
- INCORPORATE GNC HODIEL UPDATE	\ 	·			
THERMAL MODEL UPDATE			 C- ₁ -		
- AERO MODEL UFDATE		ا 		ga ga .	
- INTEGRATION OF MODEL CHANGES		 	ga es :		
7:2:5		,		ga ga ;	
- CP MODIFICATIONS	pa (m	- °- - - °-	p. 60 :	ma est	
1 - THERMAL MOEL UPDATE	go est go e go est go e go est go e				a 1
Motes:				•	•
					
	Antimal angel and date				

3.5.4.2 ENTRY THROUGH LANDING SYNS-ECH, ACA, CHILL AND CA (CONTYUD) - AEDO HODEL UPDATE - INTEGRATION OF WODEL CHANGES - EXPAND PLOT CAFABILITY - SYNS TRAJECTORY DATA TO DATE OF THE PROPERTY OF THE PRO	••
	CY 1981 JI JI AI SI OF HI DI JI FI HE AI HI JI JI AI SI OF
AND PLOT CAFABILITY AND PLOT CAFABILITY S. TRAJECTORY DATA TO ONICS TEXT O UNDER BURN PREBANK PLOT O L-LOAD PRO-ZESSOR AND TABLE GENERATOR AND TABLE	ger dan g
EGRATION OF WODEL CHANGES ! ! AND PLOT CAFABILITY ! ! P ONICS TEXT O UNDER BURN PREBANK PLOT ! P ELOPMENT O UNDER BURN PREBANK PLOT ! P S DATA MAMACHET MODEL ! P AND TABLE GENERATOR ! P ABILITY ! P M PROGRAW UPDATE ! ! !	20 Ch
AND PLOT CAFABILITY S. TRAJECTONY DATA TO ONICS TEXT ONICS TEXT ONC GROUNT TRACK PLOTS ELOPHENT O UNDER BURN PREBANK PLOT O L-LOAD PRI-ZESSOR AND TABLE GENERATOR AND TAB	00 gas (
DESTRAJECTORY DATA TO CONICS TEXT TO WICE GROUNT TRACK PLOTS TO UNDER BURN PREBANK PLOT TO UNDER BURN PREBANK PLOT TO UNDER BURN PREBANK PLOT TO L-LOAD PRICESSOR TO I-LOAD PRICESSOR TO I-LOAD PRICESSOR TO SATA MAMACHENT MODEL TO SATA MAMACHET MODEL TO	200 dae 6
US TRAJECTORY DATA TO I I P CONTCS TEXT I I I P I I I I I I I I I I I I I I I	000 000 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
TO MCC GROUNT TRACK PLOTS VELOPMENT TO UNIDER BURN PREBANK PLOT TO I LOAD PROTESSOR TO I	
TO UNDER BURN PREBANK PLOT 1 P TO I -LOAD PRC-ESSOR 1 P TAND TABLE GENERATOR 1 P PAND TABLE GENE	20
TO I-LOAD PRIVESSOR I POSTA MANACAGENT MODEL I PONTABLE GENERATOR I POSTA MANACAGENT MODEL I POSTA MANATION I POSTA MANATION OF SVDS PRODUCTS I I I I I I I I I I I I I I I I I I I	00 00 00 00 00 00 00 00 00 00 00 00 00
DS DATA MAMA CENERATOR I PRAND TABLE GENERATOR I PRABILITY DS BANKING VERIFICATION I I S. 3.11 BN PROGRAM UPDATE I I ONDINATION OF SVDS PRODUCTS I	ne de d
PAND TABLE GENERATOR PROFILITY DS BANKING VERIFICATION	77 des di
S. 3.11 S. 9.11 S. 9.11 S. PROCAAM UPDATE DADIMATION OF SWDS PRODUCTS IIII	
BA PROGRAM UPDATE 1 1 1 ORDINATION OF SWDS PRODUCTS 1 1 1 1 1 1 1	
- COORDINATION OF SVDS PRODUCTS ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! ! !	200 200 200 200
Motes:	
Notes:	



3.5 TOOL DEVELOPMENT			STS 2-4 PRODUCT	STS 2-4 PRODUCTS AND SCHEDULES	
1 3.5.5 CONSUMABLES MANAGEMENT	5	1980	5	CT 1981	CY 1962
	L IN A M P I L	JI JI VI SI OI MI DI	JI PI HI	A! S! O! #! D!	JI FI HI AI HI JI JI AI SI OF KI DI
PROGRAM NITESTONES	*** *** ***		a.	- 2	ger G er
	-		1573-2	srs-3 srs-1	
CONSTRUCT CONSUMBLES SVDS SUPPORT	,		» s» (7 gas (4 dec 4
- PRODUCTS	(TBs 732)		» « «	De gas 4	no des 9
I BEBICH PROGRAMS					
- PRODUCTS	(TES PMZ)				dan 4
I OFFLINE SUPPORT	27 day 4	F4 COM C		** as 4	
- PRODUCTS	(TBS PN2)	E		P 100 C	
I HOSE-PROPULSIVE CONSUMBLES	pr	On 1	m on (dec (m en (
- BENCH PROGRAM	pr (pr ()		D+ 0pp 4	P1 cm 1	20 au 1
1 - NAINTENAMCE NED MODIFICATIONS	6 6		- •		·
- OSTA PALL AT MODEL	m as 1	-	00 gas 0	M ga (
- DATA BASE MANAGEMENT			-	-	
i - OFFLINE	i (TBS PHZ)			Pr en -	in an a
	* ***				• the t
, ar 1			·· •	** ** *	
	77 der 6		P1 gpn 1		·
	 			14 ga, Ga	or de de
Notes:					

1 3.5 TOOL DEPELOPMENT		STS 2-4 PRODUCTS AND SCHEDULPS	F-3	
1 3.5.6 MAYICATION	CY 1980	28. 23		CY 1982
	I JI PI HE A! MI JI JI A! S! O! H! D	I 31 PI MI AI MI	Ē	AI HI JE JE AF SF OF KF DE
Sumples in the management of the sum of the		A.		
	an .	1 1875-2 1 875-3	P	
I CHECARD SUPPORT TOOLS	M de	er ger		,
- 10000	00 00 00 00 00 00	~ ~	60 gas -	des des
i - MAINTERANGE			-	
1 1 - OTHER			The type (# # # ·
I - MAZNITENANCE AND MIDS				
1 ASCENT/DESCENT HSTD			gin en 1	
- BENCH PROGRAM	an an a	The same of	Proprie	
- PRODUCTS	Tris Pre	The gas (Tr gas :	in go (
1 DROR : 3 JOE	de de de		70 aug 4	
2 - BENCH PROGRAM	and gas a	·		
- SUPPORT AS REC	de de d			1 1 gm 4
- MAINTENANCE		-		
	an an			
	The See	des des	o	u,
	w			
· •••		. don di		. 6. 4
	- D-			
* Wotes:				
M Sec. 1				
1				
r a rianted completion date - A m	Actual completion date			

	STS 2-4 PROBRITS AND SCHEDULES
3.6.1 ABCILLARY DATA	
3.6.1.1 ASCENT /DESCENT	I SI OI BI DI JI PI MI AI HI JI JI AI SI OI BI DI JI PI WE A! MI
PROGRAM NILESTONES	
STS 2	
- ASCENT GL. HET	
- ASCERT FIRM, BET	
- DESCENT FINAL BET	
STS 3	
- ASCENT QL BET	
- ASCERT FINAL BET	
- DESCRET FIRM BET	
STS 4	
- ASCERT QL BET	
- ASCENT PINAL BET	
- DESCRIT FIRM, 161	
Potes:	

i 3.6 POSTPLIGHT	! STS 2-4 PRODUCTS AND SCHEDULES
1 3.6.1 ANCILLARY	1 1080 Y2 1081 Y2
1 3.6.1.2 CNORBIT	AI SI OI NI DI JI PI MI AI MI JI JI AI SI OI NI DI JI PI MI AI MI
PRCGRAM MILESTONES	
i srs 2	STS-2 STS-4 F
I - SOPTWARE VERIFICATION	
! - DATA GENERATION	
! - DOCUMENTATION	
i srs 3	
I - SOPTWARE VERIFICATION	
- DATA GENERATION	
1 - DOCUMENTATION	
i STS 4	
! ! - SOFTWARE VERIFICATION !	
! - DATA GENERALION	
1 - DOCUMENTATION	
! Notes:	

1 3.6 POSTPLICHT	1 STS 2-4 PRODUCTS AND SCHEDULES
1 3.6.2 ASCENT/ABORTS	
and the second s	CT 1980 I CT 1981 I CT 1982
3.0.c. ASULTA	LI LI MINITER OF THE MINITER OF THE OFFICE OF THE AT MINITER OF TH
PROGRAM MILESTONES	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
! ! POSTFLIGHT ANALISIS AND DATA ! PLOW PLAH	1
PLICHT PROFILE ANALYSIS	
- ASCENT	
- ET DISPOSAL	20 20 20 20 20 20 20 20 20 20 20 20 20 2
- QUICK LOOK, INTERIM, FINAL	
w	
- ET SEPARATION	d
i - SRB SEPARATION	A
SOFTWARE ANALISIS	04 04 04 04 04 04 04 04 04 04 04 04 04 0
- ASCERT	
PLICHT TECHNIQUES ANALYSIS	(PRODUCTS AND SCHEDOLLES THE PHALL)! ! ! ! !
HCC ASCERT	
- APE ANALYSIS	2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2. 2
D4 1004	
444 Qu	
Motes:	
	•
•	

3.6 POSTFLIGHT	STS 2-4 PEODUCTS AND SCHEDULES	-
3.6.2 ASCENT/ABONTS	COULTY I NOT AN I WEST AND	
1 3.6.2.2 ABORTS	AI SI OI HI D I JI PI HI AI HI JI JI AI SI OI HI DI JI PI HI AI HI	
PROGRAM MILESTONES	O. O.	
	1 1 1 STS-2 1 STS-4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-
I POSTPLIGHT AMALYSIS AND DATA	(TBS BY FY41)	•
PLICHT PROFILE AMALYSIS		-
1 ABORT		-
- ET DISPOSAL		-
- QUICK LOOK, INTERIM, PINAL		
- SRB SEPARATION		
- ET SEPARATION		~ ~
SOFTWARE AMALYSIS	20 20 30 30 30 30 30 30 30 30 30 30 30 30 30	
- ABGRTS		
FLIGHTS TECHNIQUES ANALYSIS	(PRODUCTS AND SCHEDULES THE BY PART)	
MCC ABORTS		
I - AMEZARU ANALYSIS		-
	200 COO (
Motes:		

108

P = Planned completion date - A = Antuml completion date

				Ī
1 3.6 POSTFLIGHT	STS	STS 2-4 PRODUCTS AND SCHEDULSS		
1 3.6.3 OWORBIT	0807 A	1901 25	1002 Y	
1 3.6.3.1 ATTITUDE AND POINTING	I JI PI MI AI MI JI JI AI SI OI NI D I JI PI MI AI HI JI	PI HI AI HI JI JI AI SI OI BI DI JI PI HI	A! HI J	OI KI DI
I PROGRAM MILESTONES				
POSTFLIGHT ANALYSIS AND DATA PLOW PLAN	ga an ga an	srs-3		
1 SOFTWARE	en			• •
I FLICHT PROPILE ANALYSIS	PRODUCTS AND SCHEDULES IES BY	2		·
PLICHT TECHNIQUES ANALYSIS	20		en e	
	as			
			, and and	
				e* e= (
• •••		·	* es e	
. 601 800	* gas con * gas con * gas con			
	· · · · ·			
	20			
Hotes:				a' a a a
* **				
n s n sso .				
P = Planned completion date - A = Actual completion date	letual completion date			

3.6 POSTFLICHT	STS 2-4 PRODUCTS AND SCHEDULES
13.6.3 CHORBIT	
1 3.6.3.2 ONS MANEUVERS	AI SI OI NI DI JI PI MI AI MI
PROGRAM MILESTONES	- 0.
POSTFLIGHT AMALYSIS AND DATA	
FLOW PLAN	
! SOFTWARE ANALYSIS	THE PARTY OF THE P
FLIGHT PROPILE ANALYSIS	
PLICHT TECHNIQUES ANALYSIS	
n o n ,	
···· ••• •	
at the .	
pr 441	100
aper due (
in as p	
ping data s	
04 04	
i Motes:	
	
P = Planned completion date - A = Actual completion date	stual completion date

1 3.6 POSTELLORG	PO THE SAME OF THE PARTY OF THE
1 3.0.3 CHOMBLI	2801 X3 1 1661 X3 1 1681 X3
1 3.6.3.3 RMS	I JI PI MI AI MI JI JI AI SI OI NI DI JI PI MI AI MI JI AI SI OI NI DI JI PI MI AI MI JI JI AI SI OI MI DI
I PROGRAM MILESTONES	O.
	1 1 213-2 1 STS-3 STS-4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
! POSTPLIGHT ANALYSIS AND DATA ! PLOW PLAN	
! SOPTWARE ANALYSIS	
FLIGHT PROFILE ANALYSIS	(PRODUCTS AND SCHEDULES TES BY PWAI) ! ! !
FLIGHT TECHNIQUES ANALYSIS	20 20 20 20 20 20 20 20 20 20 20 20 20 2
I RMS PERFORMANCE	C.
STS-4 PLUME IMPINGEMENT -TR ! ANALYSIS	
** ** * •	200 gas 1
• ••• •••	
	
	200
• =- =-	
- motes:	
.	
P = Planned completion date = A :: A	ictual countiet on date

i 3.6 Postplicht	STS 2-4 PRODUCTS AND SCHEDOLES	Sal
1 3.6.3 CHORBIT	CX 1980 1 CX 1981	CY 1982
1 3. b. 3. 4 PAILOAD EJECTION	STATE AT MICHAEL STATE OF ALC ALL MICHAEL STATE OF ALC ALL ALC ALC ALC ALC ALC ALC ALC ALC	I NE DE JI PE ME AL ME JE AL SE OF ME DE
CORNA I CONTRA LABORATA	1 313-2 1 31	313-3 STS-4 ! ! !
FLIGHT PROPILE ANALYSES	0.	- Car
		
	20	00
··· «··· «··	200	00 00 00 00 00 00 00 00 00 00 00 00 00
· ••••	200 gas 4	00 00 0
	200	00 ga 0
10 ga t ya		00 00 0 00 0 00 00 00 00 00 00 00 00 00
•		**
• ••		99 gas q 99 gas q 19 gas q
		90
		· 00 00
-		gar (64)
.		(m)
· —		20
	- 0-	
f Wotes:		
		· (44 @

P = Planned completion date - A = Actual completion date	tual completion date	

3.6.4 DESCENT											
		CY 1980			1	CY 1981			5	CY 1982	
3.6.4.1 DEORBIT	JI P! H! A! M! J! J! A!	JI JI AI S	St Of KI D !	I JI PI MI	H 3	JI PI MI / I MI JI JI AI SI OI	Of Mt Di	JI PI MI	A! HI	11 31	01 HI D
PROGRAM HILESTONES	=	 	-	1	a.	a.					
POSTPLIGHT ANALYSIS AND DATA PLOW 1					STS-2	STS3	Į.				
SOFTWARE ANALYSIS	. .	PRODUCTS A	(PRODUCTS AND SCHEDULES TES BY PMM1)	ES TES BY	Preter :						
	** *** ***									Pi en EN en	
	w e					P1 400 P					
· • • • • • • • • • • • • • • • • • • •					**		- 				
	Pro Go GO	~ ~ ~									
es 27 es ·											
		.	** ***								
	400 400 400					es ** es				au 84 a u	
	an go ar										
· ••• ••• ·		. 									
Notes:											
		; ;									

3.6.4 DESCENT 3.6.5.2 ENTRYLANDING/GRILS	1									
1 3.6.5.2 ENTRY/LANDING/GRTLS										
	_	CI 1980		3	CX 1981		-		CY 1982	
	I JI PI HI AI HI JI	JI JI WI SI OI NI	D I 31 F1	M AI MI JI JI AI SI OI NI DI JI PI MI	IS IN IC	iii io	11 Pt	HI AT ME JE	11 JI A1 SI	31 01 11
PROCRAM MILESTONES				 	124	A.	- O.			
				1578-2	1 STS-3		7.65			
POSTFLIGHT ANALYSIS AND DATA					-		۵.	_		
I PLOW PLAN	 		.							
I SOFTWARE ANALYSIS		e .	 -	•						 -
FLIGHT PROFILE ANALYSIS		• •• •		•				
PLICHT TECHNIQUES ANALYSIS	(p) 450 (·			- -				
	-			-	_	_	_	_	••	
-	-	-	-		-		-			
		• •						. •		
	-	_		_					 -	-
		-	,	,	·		₽,	- ,	.	. .
-	-			_	_	_		_		
		-	-	-	-		-			_
		•••			•		٠.	٠.		
			_ •				m (
				•••		_				_
•	-	-				_	_			_
					_	_				_
	-	-		••	-	_	_			
•••	•			-	-			-	_	_
	-	-	_	_	_	_	_	-		-
		• •								
			.	-			₩ .		-	
		••				_				
•	-	-	-	-	_		-	-	-	-
•		•	• •							
	-	-	-	-		_	-	-		•
		-				_	_			
	-	-	_	_			-	-	•	
			. •	. •						-
	~ ·	***			- (• •		
		-						-	-	-
	-	-	-			-	_	_	_	_
	•									-
			٠.		• •		• •		• •	٠.
			. •							
			1	-						-
3										
••										
_										
_										
D . Diamed committee date . 1 . Ac.	time and the tare									
r + Planned completion date - A = Potual completion date	en mornardena Tena:	3								

i i 3.6 Postplicht	STS 2-4 PRODUCTS AND SCHEDULES
1 3.6.5 CONSUMBLES NAMAGEMENT	CY 1980 CY 1983
	AI SE OF NED I JE PE MEAT HE JE AI SEOF NEDE JE PE MEAT HE
PROGRAM MILESTONES	P P P P P P P P P P P P P P P P P P P
I NON-PROPULSIVE CONSUMBLES	
: - POSTPLIGHT ANALYSIS AND DATA : PLOW PLAN	(118 BI PN2)
I - MODEL UPDATE	
t - DATA BASE REVISION	
ONS/RCS CONSUMABLES	
I (TBS BY PN2)	THE BI PACE I
• =- =-	
	
	
	
· · ·	
• •••	
	0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1 0-1
i Notes:	
· ·	
	
P = Planned completion date - A = Ac	Actual completion date

115

1 3.6 Posite Light					STS 2-	STS 2-4 PROBUCTS AND SCHEDULES	S AND SCHI	DALES					
13.6.6 HAVIGATION		8	19go			8	1081				9		
	1 J1 P1 M	AT MI J	1 31 41 8	JI FI MI AI MI JI JI AI SI OI NI D'I JI PI	1 JI PI H	N AI HE J	1 JI AI SI	10 1	HI A! HI JI JI AI SI OI BI DI JI PI NI	A! HE	JI JI AI	SIO	Ē
PROGRAM MILESTONES			-	-	-	4		- 6	- 4				
						1513-2	ST	STS-3	. T.		• •	·	
POSTFLIGHT ANALYSIS AND CATA		(NORK INCLIDED		i i As Pheplican		AMALYSIS FOR FOLLOWING	DATHG MASS	1 1 167.583.108)		D			
P SOFTWARE ANALTSIS	1 200E 1									·			
PROPILE AMALTSIS	1 2000												
PLICHT TECHNIQUES ANALTEIS				.									
Potes:									:				
: P = Planned completion date = A = Actual completion date	tral compl	etion de	,										

1 4.1 OMBITED SOFTWARE					-3	STS 2-4 RESOURCES	SCORCES					:
			C7 1980			5	CT 1981			8	1962	:
	N 12 15	Ξ	14 15	St 01 111 D	1 2 1 11	A! III	18 17 1C I	5	Di Ji Pi HB	V III 17	31 AI S	0 H D
1 4.1.1 ASCENT 1 (INCLIDES SHE/ET SEP, 2 ONS MARKETURES, INCHRETT)	w go er gr				» «							10 gas den den
3	- B		1.5	3.5	.		2:5					. = (
~ ••			6.5	11 5.5	-	_	_ 6				-	
	 	_	1.5	14.5	- 4	-	1 1 15 13.5	_ ri				
	B		-	1 16.5			İ	5:2				
# 4.1.2 ABOITS												 -
		_	5:						-			
	- 11	1 2.0	-	_ #	-	-	3.5	2.5	1.5	-		
94			2.5	5.4	-	-	3.5	2.5	1.5		_	
	-	 		 							_	
F.T.3 CHORRIT		. -	. 		. 	. –					_	
SMITHUS CIM BOTTITA 1.3.1.4 !	2	-	-	-	-	-					_	
		-	_	-	-							
		-	-	_	-					-		
	11.2								-	•		_
	8		- -,						=		_	
					- -,		en en					
& 0										4 10 gal		
	, 40 1 92 0											
i ik.kes:												

	-											Ī
(CONTINUES)					973	STS 2-4 NESOURCES	CONCES					
		ש	CT 1980			ಕ	1961			CT 1982	עפ	
	13 15	7 11 11	JI JI AI SI	9 11 0	J1 P1	7 22 17	18 31	17 14 11 10		7	5	Σ Ξ Β
1 4.1.3 GROUBIT (CONCLUDED)	 -	p. 41			p. en				.,		-	
1 4.1.3.2 ONS HAMEUVERS	-			<u></u>		 '			en en :			
				1.1 ASCUIT		 •		-				
	=	,	,								e	
	8											
1.1.3.3 3865		- **	gu gu		-			e-				
	2.1.5	.	.				.	·			• •• •	
	contie.5	-	-		-	-	-		» - -	>		
	- 1	-		-	-		_				e	
									•	÷.		-
	-					. =	•	. 		-	. =-	-
A.1.A DESCENT A.1.A.1 DECHEST								 -				
	 8				4.				~ #			
	COBILE		11 COOR	1.1 ASCUR			•	• •• •	•	•	• •• •	• •
	Ę								» (- •		-
	1	P == 1		200 ggy 1		 .	P e4 1		-	(s. (
		D qu 4				•	.	eu •				-
		* - •					» « » «				•	
							7) go (7)	* e. e.				
lotes:												

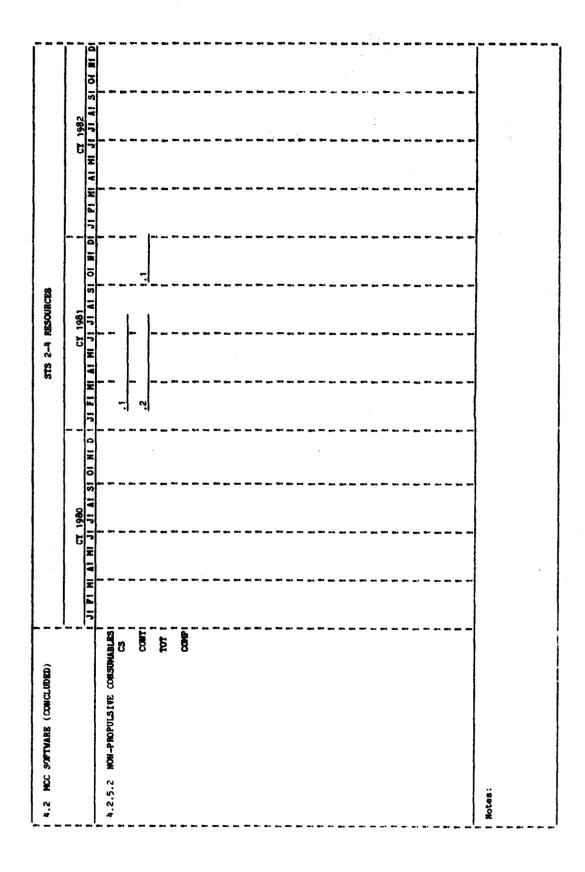
	ľ													
1 4.1 OMBITER SOFTWARE 1 (CONTINUED)	·		·		:		512 2-1	STS 2-4 MESONCES	7					
	' '		E	CZ 1980				1961		 		g	¥	
	+	11 11 11	C III IV	4	SI OI BY	11 11 1	H A	2	1 3 9	Ā	1 7 E	7 88 17	J1 A1 S	3
1 4.1.4 DESCENT (CONCLEMED) 1 4.1.4.2 ENTRY/LANDERGYGETLS		- 67 64												
~ 4	8		3.	2	2.5	7	3.5 3.4	<u> </u>		2:5	-			
	8			mi	3 2 1	-	- 5:5 - 2:5 - 6:	اد ای اد ا		7	I			
M ga	ğ	.	í.	5	5.5 7.5	Ì	01 0	1		5 1.5				
400	8	tra/es.1	3.		11 25 47 181	22	5.5 10 46 99	S11 88	8 7	- 5				
t 4.1.5 MATIGATION					7		2		. -		_ ~	-		
t 1.1.5.1 ASCENT	 8													
e • e	- 6			 -			 -			•	-			
			E	. ET . ET		* æ 1								
12 52	<u> </u>							-	» ••	~ -				
•••	8			•, •			~ =							.
t 4.1.5.2 ONORBIT			•			. '				-	. — .			
	3	-	0:Z		-			-	-	-				 .
	8		11.5		.	. :	.	٠	•	•				* ==
.	- <u>-</u>	**	13.5		_	- 2.3	- -	••	-	-				
60 gai	- 8					 		-		 	-			
	-	-		:								•		
				. -				- -			en en			
***				 -				_	 -					
					<i>-,</i> =		. ==							
i Notes:														
₽ •														
Qua Qua			•											
0 + 0														

CCT 1980 CS CS CS CS CS CS CS CS CS CS CS CS CS C	4.1 ORBITER SOFTWARE (CONTINUED)					STS 2-4 RESOURCES	ESOURCES				
3 DESCRIT (CONCLIDED) 3 DESCRIT (CONCLIDED) 4 ONE STREET HANDERST (CONCRIDED) 5 ONE FIRST (CONSTRUELES) 6 ONE FIRST (CONST			5	1980		"	1981			CX 1982	
DESCENT CS CS CS CS CS CS CS C		1 31 F1	A! H!	A1 S1	D 1 J1 P1	퇴	31 31 AI S	O IN DO	PI MI	15	St 01 B1
CONSTRABLES HAMAGENERT CONSTRABLES CONSUMBLES CONSTRABLES CONSTRABLES CONT TOT TOT TOT TOT TOT TOT TO	4.1.5 NAVIGATION (CONCLUDED)	. . .	 -				_ ~ -			., c	
CONSTRAILES MAINAGEMENT 1 NOIS-PROPULATIVE CONSTRAILES CONSTRAILES CONT TOT TOT TOT TOT TOT TOT TOT TOT TOT		. - .								•	
CONSTRABLES MANAGEMENT 1 NOM-PROPULATIVE CONTT CO		SOUTE		: : : !	 .						n e n (
COMSUMABLES MANAGEMENT 1 NON-PROPULSIVE CONSTITUTION TOT TOT TOT TOT TOT TOT TOT TOT TOT T		- - -		1 (944 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	-						e
ONISUWABLES MANAGEMENT 1 NON-PROPULSIVE CONT		004E	 .	e e (ga 420 (., as (:	
CONSUMBLES CONT. TOT 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	A.1.6 CONSUMABLES MANAGEMENT A.1.6.1 NON-PROPULSIVE				p. 64 g.,					, e a	
CONTINUES CONSUMABLES CONSUMABLES CONTINUES CONSUMABLES CONTINUES		- -			_:	-					
2 OPS/RCS CONSUMABLES CS		Source				- -				-	
CONFO CONSUMABLES CONTINUES	- 1 01			2:	 -		2				
CONTINENTS (TBS)		CO469			P = 4	·					
TOT TOT TOT TOT TOT TOT TOT TOT TOT TOT		- - -			N gas diri		·			* es =	
101 TOT 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		- I									
		701	1 (188	BY PPC) !			· • •-				
Motes::		<u>.</u> මේ පි	·		· ••• •••	· 				9 9 9	·
Motes:					,- -	- -					
Motes::		 -	s		en .	 .	 (pas 400 (
Motes:											
	Notes:										

 4.1 ORBITER SOFTWARE (CONCLUDED)	gas 6 1 set			STS 2-1	STS 2-4 RESOURCES	n				
		CY 1980			CX 1981		:		CT 1982	
	I JI PI MI AI MI JI JI AI SI OI BI D	1 1 1 V St 01		JI P! H! A! H	1 1 1 11	I SI OI NI DI	14 F	IF IN IN	31 A! S!	At St Of Ht D
1 4.1.6 CONSUMABLES MANAGEMENT					. -	,				
I 4.1.6.2 GMS/RCS COMSUMABLES	ga. 004 ga. 004		p							
CS	 	<u></u> -	<u></u> -		~			-	904 (00)	
8	comi		• •• •	· ·	· •	•				
PL	10T 1 1 155	1 142)		••			··· ·			-
	CONTRACT							 		
				 -		 ,			•••	
## ##							~			
				·		• ••	•			
8001 W			•• •				•••			"
					. -	ps. 1201	. •			
***			- -				.			
			•		• ••• •					
p1 p1	·· •					<u>-</u>	· ·			
(5) 1 (5)1								••• •••	 -	
•••		 ,		(,	 .			
p1 w1	 -				,, 400		 .			
				•• ••	••• =•	 ••				-
. •••					 -					
·· ••				• ••• ·		•	• •			
ma qua										
	***	-	_	-	-	-	-			
Motes:					,					
gu 94										
.										

4.2.3 DESCET: BITTIST LAND 1.2.1 ACCET/ABORTS DEDBATT 1.2.2 DESCET: BITTIST LAND 1.2.3 DESCET: BITTIST LAND 1.2.3 DESCET: BITTIST LAND 1.2.3 DESCET: BITTIST LAND 1.2.3 DESCET: BITTIST LAND 1.2.3 DESCET: BITTIST LAND 1.2.3 DESCET: BITTIST LAND 1.2.4 DESCET: BITTIST LAND 1.2.5 DESCET: BITTIST LAND 1.2.5 DESCET: BITTIST LAND 1.2.6 DESCET: BITTIST LAND 1.2.7 DESCET: BITTIST LAND 1.2.8 DESCET: BITTIST LAND 1.2.9 DESCET: BITTIST LAND 1.2.9 DESCET: BITTIST LAND 1.2.1 DESCET: BITTIST LAND 1.2.2 DESCET: BITTIST LAND 1.2.3 DESCET: BITTIST LAND 1.2.4 DESCET: BITTIST LAND 1.2.5 DESCET: BITTIST LAND 1.2.5 DESCET: BITTIST LAND 1.2.7 DESCET: BITTIST LAND 1.2.8 DESCET: BITTIST LAND 1.2.9 DESCET: BITTIST LAND 1.	I 4.2 NCC SOPTMARE							2 STS	STS 2-4 RESOURCES					
OWORDIT ATTITUTE AND TOTAL TOT					98			6	1961			E	585	
ONDESTY ABORTS DECORDS 1			P! P!	A H	1 31 41 8	0 11 0		I At Hi	JI JI AI S		=	A1 PR J	31.41	S! O! #! P
ONDIRECT ATTITUTES AND COMPT. 1 3 6 6 6 6 6 6 1 4.6 6 1 1.6 6 1	1 4.2.1 ASCENT/ABORTS DEGREET							.,						
ONDORSIT ATTITUE: AND ONDORSIT ATTITUE: AND	M Sai	3				-			_		j-			
DESCENT BYTH LAND COMP TOT 11.2 COMP TOT 11.2 COMP TOT 11.2 COMP TOT 11.2 TOT 11.2 COMP TOT 11.2 TOT 11.2 COMP TOT 11.2 T	*	8		ml 					5.5		~	,-	-	
OUNDESTIT ATTITUTE IN THE POLITIFIED CONTRIL C		10		m	3.6				6.1	4.6	. 2	~ 		
POINTING CONTIN CONTIN TOT 1.2 CONTIN CONTIN TOT 1.2 CONTIN CONTIN TOT 1.2 TOT 1.2 CONTIN TOT 1.2		300			.	.		~ ••			.	~ =		
DESCEZ: ENTRY-LAND CONT. TOT 11.2 CONT. TOT 11.2 TOT		 '			·	=	.		.		6 14 gs			
DESCRETE BATTRY—LAND CONT. 1	TOTAL THE STATE OF	8	, ,	_	-	- -		_			*** ***	 -		
CONFT 1		3			_	_	_	_	-	_				
DESCRET ENTRY—LAND CS 0						-	-	_	-					
DESCET: ENTRY-LAND CS 0 1 1 1.25 1 1.		5				-			-		 .			_
DESCENT BATTRY-LAND CS 0 1 1.25		8		.	• ••• •	• •••			M esta !		· ·	-		
CONT. 1 .75 .5 1 1.25 1 TOT. 1 .75 .5 1 1.25 1 CONF. 1 . 2 . 2 . 2 . 2 . 2 . 2 . 2 . 2 . 1 . 25 . 1 . 25 . 1 .	1 4.2.3 DESCETT ENTRY-LAND			<u> </u>						 	-		.	•
TOT 1 1.25 1 1.2	3 4.	8			e- e-					-	-			
One 1 3 5 1 1.25 1 1.25 1 1.25 1 1.25 1 1.25 1 1.25 1 1 1.25 1 1 1.25 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		100 1100				اع ا		-5-	1.25.1	.5		,		
		ğ				 - -		اء اء_	1.25	5.	. I			
		8		.	- 2	* -		2 3	2					•
	100 4 be				-			 	 		-	_		
									· -					
					924 g aa			.			 			-
**Cres:	pr. 91. 44.				en en en				w g, w					
	Notes:													

#.2.8.1 ASCRIFORSCRIF MAY CS 12.8 W.2.8.1 ORGABIT MAY CS 12.8 W.2.5.1 OR								STS 2-4	STS 2-4 RESOURCES	3 3						
CS 12.8 CONFT 12.1 TOT 15.9 CONFT 12.1 TOT 10.1 CONFT 12.1 C					1 1:				Y 1981					1982		
CS 12.8 2004713.1 TOT 15.9 CONT. CONT. CONT. CONT. CONT. CONT.		-		Ē	7 7	i i	=	2	4 10 -	5 -	= -	=		-	<u> </u>	
1 ONG-REJT MAV CS 12.8 1 ONG-REJT MAV CS 1 TOT 1	4.2.4.1 ASCENT/DESCENT MAV					_			_	-	-		. ,	.		
200F 13.1 TOT 15.9 TOT 15.9 TOT 15.9 TOT 15.9 TOT 10.9 COMP. 12 hrs/week 3 hrs/week COMP. 12 hrs/week 1 oves/recs COMP. 12 hrs/week COMP. 12 hrs/week COMP. 12 hrs/week COMP. 12 hrs/week COMP. 12 hrs/week COMP. 12 hrs/week COMP. 12 hrs/week COMP. 12 hrs/week			 •					- -	 .							
TOT 15.9 TOMORBIT NAV CS 1 TOT 1005/RCS CS 1 TOT 1007 CONFILE CONFIL		20MT 13	-						•	٠ ـ.	•				-	
COMP 12 hrs/week 1 ONGRBIT NAV CS 1 1 ONS/RCS C3 1 1 ONS/RCS C3 1 1 OT 1		<u></u>	 d		.	 -	-	 -					- -	 -		
COMP 12 hrs/week 3 hrs/week 1 ONS/RCS CS 1 CONT 1 C		<u>-</u>	. -											 .		
OMESTE NAV CS 1 OMES/RCS CS CONT TOT TOT TOT TOT TOT TOT TOT TOT TOT T			2 hrs/we	ek (1108	_										•	
CONTINUES CS 1707 TOT TOT TOT TOT TOT TOT TOT TOT TOT TO	W. 2. 4.1 OMORBIT MAV		5 RF3/86	(2/C)							-					
TOT TOT TOT TOT TOT TOT TOT TOT TOT TOT		8	:	(1188	94.		. 🛶 ,		-				. ,	. 🕶	-	
TOT 1 TOT 1 ONES/RCS CS CS TOT 1 TOT		00 III				- -										
COMES/RCS CS CS TOT TOT TOT COMPS		- }			 -		•			٠.	•		.		⊶.	
COMES/RCS CS CS TOT TOT TOT		- E			pt									· ·		
CONTINUE CON		3400	. = .					. .	-				. ••• •	(• ••• •	
50 101 101 100 100 100 100 100 100 100 1	4.2.5.1 OMS/RCS	-, -·					·		p. 40-	 •-		,		 ~		
		უ უ		(TBS	(2) -					⊷.					-	
		CONTI	'		۰ میده ۹	• •	•	• •••								
		 <u>1</u> 01												- -		
		-	_		_	_	-		-	-	_		_		**	
					.		-			 -						
					•	٠ ـــ			.	- =	•		٠	• ••	•	
		-												 -		
											. –					
Notes:		gan 2001			.		-				 -			- , -		
**Potes:								·	· 	· 						
	totes:															
												•	٤.			
													ŧ			

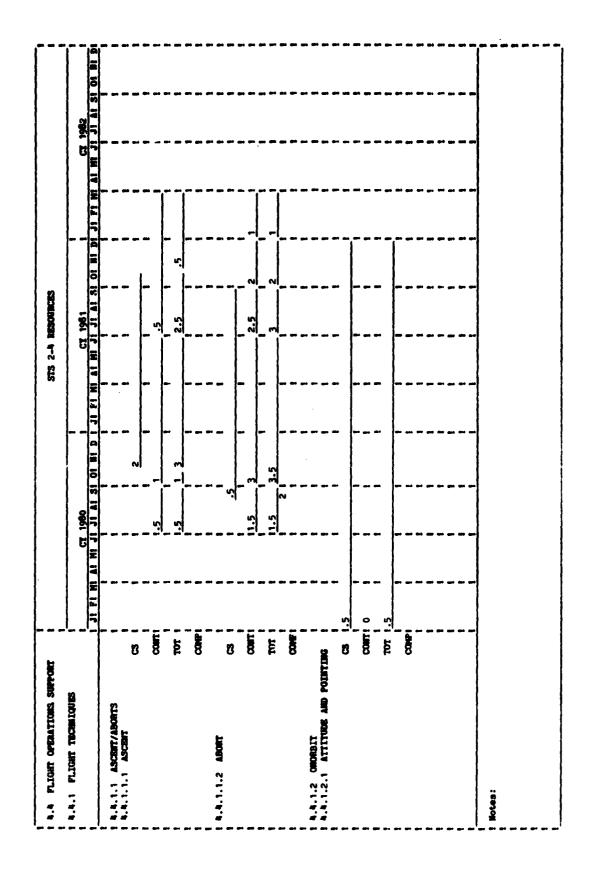


1 4.3 PLIGHT DESIGN							ស	13-5-E	STS-2-4 RESOURCES						
			6	CY 1980				6	CT 1981			5	Cf 1982		
		JI PI HI	E	_	3! O! II!	Ω	PI HI	AI HI JI		31 01 311	11 11 10	HI A! M!		\$1 01	
6.3.1 GENERAL	8				m en en						·· ••	m _ m			
	. THOS		1 71M9 Y8	<u>-2</u>		e-									
****	Ę				 -								·		
	8						 •- •					gas 400 ((
1 4.3.2.1 ASCERT (INCLEDES	8	2.5		3.5	1.5	5.5	-	- 	4.5 3.	1.5	j	100 (100)	 ••• (
RANCE SAFETI	08 TH		=	_ ~	ا ۔	- 5	-	-			2	₁	ps 04 :	··	
	현	2.5	6.5	_	- 10.5	-	-	- 	8.5	6.5 4.5	_ ~		g. es	- -	
-	8								٠. د:		 •	e. ==	÷		
1 4.3.2.2 ASCENT ABORT:												, 			
	8	۔۔۔۔ ۔۔انہ			<u>-</u>	-	-				,-				
	00 TE	. v.		3 2.5	اً.		•	3:5			. 7	· • ₁ •			
	101	 		~	. 9	2 -	-	4.5		. =	. ~	₁			
	8		3.5	3.5				 						** **	
															
														** **	
								•							
				··· ··									E4 84		
Notes:											• .				
										2					
W															

1 4.3 PLIGHT DESTON								TR. 2.4	GTS. 2.4 BRST/BCRS	9.						-
						ŀ										-
ha die	 '		- 1	1980				घ	CY 1981				ខ	1982		
	- -	Z .	A H	J. A.	SI OI E	_	JI PI HI	A! M!	17 17	St 01 B	DI 31 P1	11	2 1C 1H	18 17 1	õ	ā
1 4.3.2 SRB/ET SRB/ET SRB/ET (H) DISPOSAL	₂₁															
(m) name ourell)	8			1:1	-21	-	-		2. 2.1	_						. ~
	. <u>F</u>	 '		구 -	_ ;	3.1		-	_							
	Ę		-	1 2.2 2.4	- 1 2.6	4.6	- 4	.5 2.4	3.2		₁				 -	
	200													_ =		
# 4.3.3 ONORBIT # 4.3.3.1 TRAJECTORY AND # ATTITUDE POINT					- -				-							~ ~ - -
	3	3:5			2:	.			.	,	•	• ••	• ;=•			-
	S011	0													- -	
	Ę.	3.5		_	 2.5	-	-		_	,			~		.	
· ·	8	•				- - •	 (·			(, = -	BA (
I 4.3.3.2 RMS AND P/L EJECTION AND							. <u>.</u> .									=
PLUME MANAGEMENT	g 	2:			-	-	Ì				-j					-
	CONT	3.6			-	3.6	-		_	3.7	3.6	qu				-
 -	<u>\$</u>	- 8.		-	-	œ				- -	- 80.					
						 				 	 	, .				
p. gr. go																
i Notes:												,				

1 4.3 PLIGHT DESIGN						STS-2-4	STS-2-4 RESUGRCES					
			CY 1980							1 1	1982	
		J1 F1 M1 A1 M	2	St Of NI D	- 5-	M A	=	S! O! M! D!	J. P. H.	H H	JI A!	S! O! N! D
4.3.4		 .	 .	" . .	 .		·		.		_ = .	.
1 4.3.4.1 DEORBIT	8			- -	<u>ښ</u>		_	_	- •			_ ~
	CONT	g. S.	- -		- -	 -			*. **	. -		.
 -	101		·		 	-						gs. Gs.
80° 90	- 6								·.===			-
t t.3.4				· -	· •	·	• •• •	٠				
i i i i i i i i i i i i i i i i i i i	ช	.5	1 2.5					·	·		******	
pr 400 a	CONT	13 3.5	ان <u>د</u>	9.0 9.5		8 5 1.5	5-1-5					
M en	ξ	13.5 4.5		9.5 10 10.5 12 13 13.5	5 8 5	10 3.5	2 .5					-
gu (#		15 67 1	2 ۽	.5 12.5 126 58	1 1.55 1.50	ر. ا	<u>. </u>					•••
- 200 6		F.	E.	55 60		اير	1 67	. .				
1 4.3.5 NON-PROPULSIVE		e			<u>.</u>				. . .			
	8	2.5 	=	2,1 1.1 3.1	1.1.2	2 5.5 3.1	- I - I - I - I					
. ••• ••	CONT	-1	. – -	F	~ <u> </u>	2.5	2,12,1					
	Þ	3:51] 	3 1 2.1 6.1	1,3.2	1.15						. e
	8	• ••• •-										
						. .			,			, e
P				 (.		, 	 ,	, es			p. a.
Fotes:												
												
1												

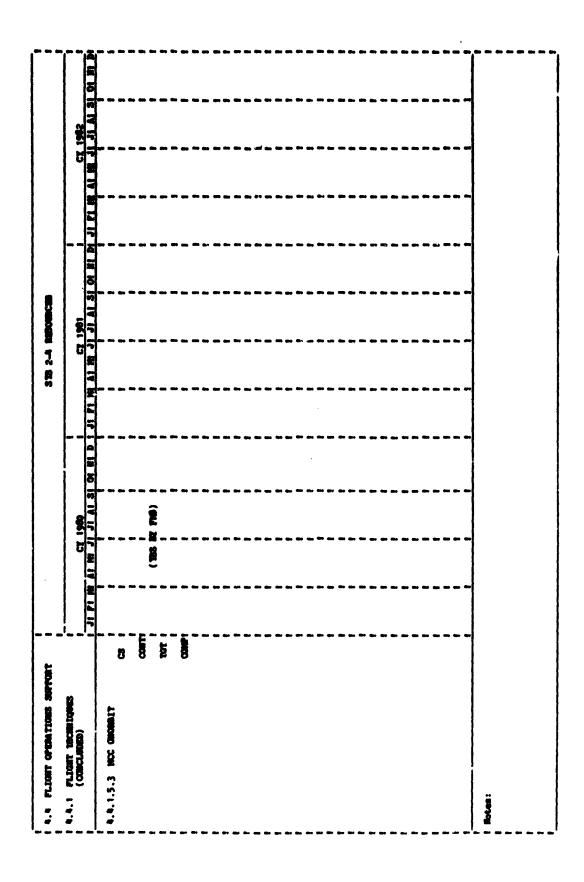
4.3 PLIGHT DESIGN							12-2-1	STS-2-4 RESOURCES	e .						
***	<u> </u>	6	1980				3	1981				286	22		
		J! P! 191 A! 101	JI JI A!	S1 01	11011	J! P! H!	A1 M1 J	JI 31 A1	A1 S1 O! #1	DI JI PI	Z.	2 21	1 At 51 Of	8	Ē.
1 4.3.6 ONS/RCS CONSUMABLES	 g						_					po 404 gas			
	8														
	- 1		. 2	EN 2)					, == ==	,			, =		
. == ==	8	. – .	<u></u> -	. 					·	. -	. == ==				
1 4.3.7 MAVIGATION								~							
~ • •	 8			e.				~							
	TIMOS		_ 1	- 6	 -	-		, .					. = .	· •• -	-,-
	Ę		ă) ·					,, ,	 .			- TAN 0		
int Or	 8											-, -		_ ~	
**									₂₇ , 44						
-															
~~					e-										
								~	en en						:
Q 1.1 Q 1.1		_ ~						<i>-</i>			94 89				
									es			- +			
		e-			<u></u>								_ =		
					••										
i Botes:															<u></u>
· ••• •••															
															_



1 4.4 PLIGHT OPERATIONS SUPPORT						STS 2-4	STS 2-4 REDOUNCES					
4.4.; PLICERT TECHNIQUES CONTINUED)		5	1980			5	1961			Ct 1982	286	
	1 1 11	F		Q 18 10 1	1 JI F1 K	=	1 JI JI VI SI 04	17 10 11 10	=	A! PB J!	JI JI VI SI	2 2
1 4.4.1.2.2 ONS NUMBOVERS	 8							. - -			. .	
-	CONT										611 611	84 64
	101		(1.04.9 TB)			e- m						
	1.000					***		о ч _{вы} .			-	
4.4.1.2.3 BMS (PLUS PLUMS) 4.4.1.2.3 EMS (PLUS PLUMS)	-					#* es	e.	-				C
	- E				8	_	-				1 164	-
	2 12				1	-	-	 		-		
**	-										-	
I 4. 4. 1. 2.4 PATLOAD EURCTION								~				
	 8				۷.,	 ••			- -			
Dre agai	17800 1.			•• ••	1.5	_	-	-			 u	
201 30	101				1.5			-			en -	•••
g 1804 Sec						· •, •		- -		* **	* **	* **
- En										• •• ••	-	•
					· ••• ••• •							
	** *		_ ~ .		•			-	•• •	,, e =		
									•-			-
Motes:												
												• •• ••

(4.2) PLICAT OPERATIONS SUPPORT	STS 2-4 NESCRICES
1 4.3.1 PLICHT TECHNIQUES 1 (CONTINUED)	1 1967 12 - 1980 12
	JI AI SI OI EI D I JI PI HI AI HI J
1 4.4.1.3 DESCENT 1 4.4.1.3.1 DESCENT	
8	
LIEDO CONT.	
101	
40 0	
! ! 4.4.1.3.2 ESTET/LANDING/CETIS	
8	1 2 3 1.5 2.5 1.5 2.5 2.5 1.5 1
THEO	II 1 2 3.5 2 3 2 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
101	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	
200	133 77 62 50 73 95 57 40
1 4.4.1.4 CONSUMEDLES PARAGONIST	
BVI.2.1.4.1 BOH-PROPULSIVE	
8	5.11.
COUNT	
107	
Botes:	

1 4.4 PLICHT OPERATIONS SOPPORT				STS 2-4 NEOUNCES	SOUNCES				
1 4.4.1 FLIGHT TECHLIQUES 1. (CONTINUED) 1	5	961		1961 25			CT 1962		
		A: S: O: B:	M 14 17 1 0	A1 NB J1 J1	41 51 01	E! D! J! P! M	At M Jg 31	11 31 01	
18.4.1.4 CONSTRABLES MANAGEMENT (CONTINUED)					⊶ • • • •	in 40 gr (p. 44 gs. (n == e+ 1
1 4.4.1.4.2 ONS/PCS CONSIGNABLES 1			en en e						
	· •• ••								
Đị.		·	to 1		 .		 •		
			en e	n •= •			m = 0		
1 4.4.1.5 MAYIGATION 1 4.4.1.5. GREGARD SOFTWARE CONOMINITIES CS CS							. ** **		
	, 	-				1			
1 101		- 2-1 - 2-1 - 2-1	-	-	-				e+ e=
				6 1 6 1 6			<i>-</i>		
4.4.1.5.2 NOC ASCRIT/DESCRIT	, a G						.		
				. 40. 40.					
Į.		ê E			. 44 64		. 		
		o, m , o							
							• • •		• • •
									- 1
Motes:									bo des des des
									~ ~ ~ ~



THOUGHT SHOUTH OPERATIONS SUPPORT			CTO 2. It opportunities				[
THE STREET ATTACHMENT OF A PARTITION				•			
The second secon			CT 1981		5	1982	 ••
	I JI FI MI AI MI JI JI AI	SI OI NI DI JI PI MI	A! HI	01 N1 D1 .11 P1	MI A! MI J	Ji Al SI 01	10
14,4.2.1 ASCENT/ABORTS 14,4.2.1.1 ASCENT 1 14,4.2.1 ASCENT 1 1	DE gas des d Re dist en g						
I SO THEOLOGICAL STREET		- 2		-			
THEO		0			es es		
I TOT		- 21	1	•			
#.4.2.1.2 ABORTS						 :	·
		c,	-	-		 •	
							
- LOT		<u>.</u>					
11000		• •					
1 4.4.2.2 ONORBIT	16 aya gar 10 gar alif	tri aus ani					
8	(TBS PNE)					• •	
THO		* en •	·· .			 ·	200 gan (
TOT		M aas € N aas €					
CORP	· · · · ·	P en 1	P ¹ CO (·	
						(
	en en	- e, e.	P	P			
			-				-
Hotes:							
							-

	_								ł 							
1 1.4 PLIGHT OPERATIONS SUPPORT							82	24 MB	STS 2-4 RESOURCES	en.						
1 4.4.2 SIMILATION AND REALTINES (CONTINUED)		8	1980		-			2	186				5	1982		
	I JI PI M	AI MI J	1 J. A.	JI 71 VI SI OF NI	10 11	JI PI HI	MI A! MI	H 31 31		SI OF MI DE		JI PI HI AI	=	1 31 31 At	81 01	ä
4.4.2.2.2 OKS MATEUVERS		•													 ,	
3					•		·			 .			,	·		
		INCLU	INCLUDED IN	4.4.1.1	1.1						.			 ~~		
			·							 -						
1	= -									· •						•
# 4.4.2.2.3 RPLS														-		
													_			
LIDO		, - (. -						. 🛶 .		• •• •	- '	. ••• •		
161								-,								
													-			
1 4.4.2.2.4 PAYLOAD EJECTION		_ •								<u></u> -				 •		
3			•		. =		٠	• •		•	H 914	·	-			*
	- :					-	_									
					·* ==		_	-		_	-	-				
		=-			'	-	_	-		_	-					
								•					-			
	• •••						-	* **								-
		- =1											•	 .		
		•											•		٠,	
·											. ~	-				
												-, -				
i Notes:																
																-
• •••																
																ļ

MID REALTINE !				STORY HEROCES			1
1 10 1	40.		į			ege. Au	
	HI A! HI JI JI A! SI	SI OF MED I JE PE ME	I MI A! MI J! J! A	JI 41 St Of	Ri Di	SI PI MI A! MI SI SI AI	SI OF M! DI
1 4.4.2.3 DESCRIT			(10. 00.	an a n			
S		*		-			
1718							
TOT		**	-	-	-	96 COM (pa 6 04 (
400			-,				
1 4.4.2.3.2 EMTRY/LANDING/GRTLS :					 		
i CO871	o.	- 2	1	-		- 6 1 - 64	
1 100		- 22.	1.25 -25	1.5	.5.1.25		4.
	to	5.1	- 5 5		2	*	W. C.
1 4.4.2.4 COMSUMABLES MANAGEMENT 1	204 gay quá 204 gay Qu		e-			G . 21. Co.	
CONSUMARLES (INCLUDES TOTAL STATIONS)	ma 400 (an an .				The Con (
CONFIGURATION MANAGEMENT):		-	.5.	- 8-	- ⁻ -	-	
- II		2	2.3 2	2.3	. [.]		
T TOT	1 2.5	1 1 3	3.1 2.5	3.1		gs	
1 2400	an an						
One Offi	.	pu == :					
	3 04 5 04	a. a.					
: Motes:							
a. b. 1							
-							

1 4.4 PLIGHT OPERATIONS SUPPORT		i					878 2-4	STS 2-4 RESOURCES					
1 4.4.2 SDAJLATION AND REALTINE (CONTINUED)	'		5	98			6	Cr 1981			5	CT 1982	
	'-	JI P! HI	MI AI MI J		St 01 161 D 1		JI PI MI AI MI	J JI A!	A! S! O! N! D! J! P! H!	31 11	7	31 JI A1 SI	0 11
1 4.4.2.4.2 OMS/RCS CONSOMABLES			28	 			•						. e. e. =
	200 ETE		 •							· • •		·	
	Ę		 ·	·									
	COMP		•	.		·· •							
# 4.4.2.5 HAVIGATION # 4.4.2.5.1 ONDOAFD SOFTWARE	8			.					na gua da n				
and Transport	3	. •• •				_	_	_	_				
20 dia	3		. 		7	-		-					
	<u>.</u>		-		9-			-	-	-			
	8								•				
1 4.4.2.5.2 MCC ASCENT/DESCENT			E	AM								=	
. 604	· }]	ì -					_		-		
54 60	8 !	0.9	_		-					~ _		-	-
	5	2.9	•	· •• -	. -							. == ==	
• mas die	8	6 bours/week	week (370)	. 39			. ••• •••						
											en en		
				. =- ~					. -	 -			
	. =				, == ,,,	· ,		. == (. = = .				
liotes:						_							
•••													
e+ 0													

1 4.4 FLIGHT OPERATIONS SUPPORT			SIS	STS 2-4 RESOURCES	RCES				
1 4.4.2 SIMULATION AND REALTIME (CONCLUDED)	CT 1980	0		CX 1981			2	1982	
	JI PI MI AI MI JI JI AI SI OI WI DI JI PI MI AI MI	A1 SI OI W! D	I JI PI MI AI	10 IN	JI JI AI SI OI BI DI JI PI MI AI ME	Di Ji Pi Hi	A1 P2 J1	JI JI WI SI OF IN	id in io
i 4.4.2.5.3 MCC ONORBIT CS	1 (188 BY PH6)	 <u>Q</u>	,		_ •			. 	
1 CONT							· = -		
TOT		 -				~			
8)600		e 1 ea e	e. •				• • •		
• • •					•			 -	•
					w e. •			- 	
	·	P4 ass -			·			B- 444 (
on 682 (·		·		 ·	
in or ,	en en :	 :							
 •••		· =• =•						~ -,	
 •••		80 80							
ga Se					- North Com			***	-
		- -		. 	. -				•
				🕳	, .				
t		 ••			•·				- ·
.									
								84 84	
i Notes:									
n (s)									••
ort ma									

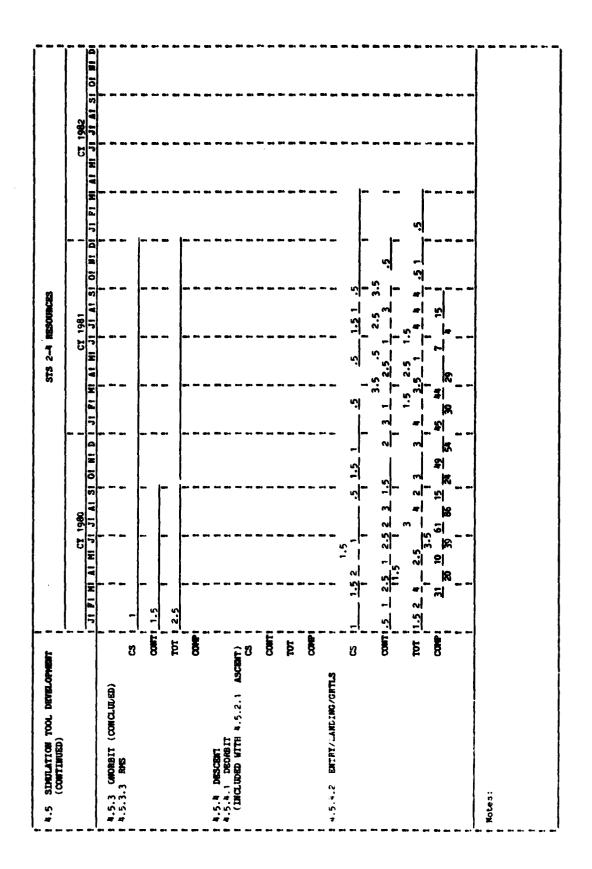
C

()

4.4 FLIGHT OPERATIONS SUPPORT						STS 2-4	STS 2-4 RESOUNCES	8						
1 4.4.3 SYSTEMS DESIGN SUPPORT		1980	8				1981				1 8	585		
	I JI FI HI AI H	A! H! J! J!	F	St Of #1 D	1	HI A! M!	JI 31 A1	1 St OI K!		DI JI PI MI AI	国	31 31 41	S! O!	01 HI BI
4.4.3.1 NOM-PROPULSIVE CONSUMABLES		1 1 (TBS BY PH2)	·		. -								a	
THICO										***			e- e-	
TOT					» «							-		
1400					·							=		-
4.4.3.2 ET DISPOSAL		(TBS BT			·									
1200								_ ~						
TOT					 ,								 =	
a a a a a a a a a a a a a a a a a a a							 .	 -	 ,					
													
				,	.		- -			-				~ ~
(T) (;									
wa 400 G							 •••							
	<u>.</u>											e		
						. – .				. •••			. 	
							. .					. — (
					m == ,	 .		-						
										~ -				
* Motes:														
be some :														
														
														•

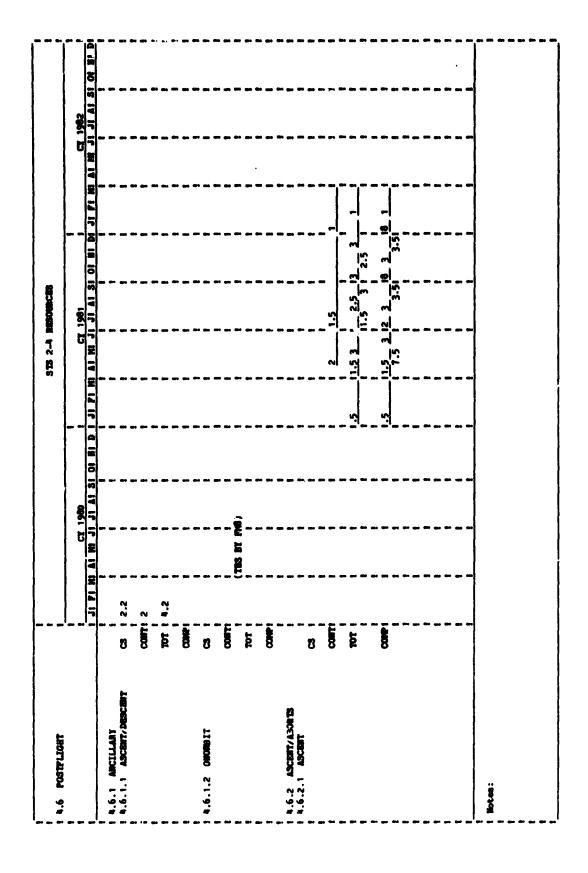
1 1 INTEGRATED DIVISION TOOLS	-					STS 2-	STS 2-4 RESOURCES	22				
1 1 1 INTEGRATED DIVISION TOOLS		5	CT 1980				CX 1981			23		
1 4.5.1 INTEGRATED DIVISION TOOLS	1 31 PI HI	At MI J	1 21 A1	JI PI MI AI MI JI JI AI SI OI NI D I	, ,	H T H	=	SI OI NI DI	1 JI PI ME	At 46 JI 31 A1	31 41 31	Q 18 10 1
			<u>.</u>				<u>.</u>					
80	1.5					5.5	3.5	-	1.5	- ·		
COST		ا <u>ج</u> 	20.5	53	-	28.5	22.5	15.5	10.5	, بد نے		
TOT	2	52	29.5	.5 27.5	-	- 4 6	- %	19	12			
1 4 4 6 5		E8/80	0#1 0#1	152 151	-	! 187	143	011	. ₃₈			
1 5 1 5 1 108		-	器 -	a			 -	··· -				
8	. .				• •		4					
CONTRACTOR	٥			.	_ =	_	-	-			_	
101	 				_=			-	_	~ ~		
					16 hr/m	_				***		
4.5.2 ASCENT/ABORTS			. 									
8				2.5	-	_	-	 				
1 I I I I I I I I I I I I I I I I I I I			- _v .	_ ÷	j	_	.5	 -				
102			.5 1.5	5 2 3.5	-	_		- 5	·			
8000	- 2		:						ļ			
					 =+ .			<u>.</u>			-	
								a, to a, to				
Motes:												

19.5 SIMULATION TOOL DEVELOPMENT (CONTLINUED)								STS 2		STS 2-4 RESOURCES							
	·		5	1980			l		5	6				CX 1982	282		
	-	J1 F1 H1	FI HI AI MI JI	1 JI A1	<u>s</u>	31 01 11 0 1	JI P! M!	=	L IL IM	JI VI SI OI HI		Di Ji Pi		HI AI MI JI JI AI SI	11 A1 S	ō	
4.5.2.2 ABORT	 g	 c													-		
	3 2	· — —				. =-*			. .	. —	,			. .			
	Ę			5	 			_	 .:		1		69 au	~			
					 	·			<u> </u>		1			***			•• •• •
4.5.3 OWORBIT 4.5.3.1 ATTITUDE AND POLBTING		- 		. .			.										
	8	-; - -,		_	-		1-							es es e			
	5 5			_	-		-	-		-							
	8	- - 					 										
1 4.5.3.2 ONS MANEUVERS 1 (INCLUDED IN 4.5.2.1 ASCENT)												eu eu					
	8																
	8																
	8																
																	
				• •• == •							•			•			•
							_			-7							
Motes:																	
															İ		



		1													
4.5 SINCLATION TOOL DEVELOPMENT (CONTINUED)	·						5 0	13 24	STS 2-4 NESCONCES	•		į			
	·		5	CT 1980				៦	CT 1981				1962	אַ	
		J1 P1 H1	AI MI JI		St 01 H	5101	<u>=</u>	AT MI J		\$1 01 111	12 10	NS At MY	٦		St 04 Ft D
4.5.5 CONSUMABLES HANAGEMENT 4.5.5.1 NON-PROPULSI WE CONSUMBLES	EBLES!			m == ==		m 44 en			 -						
	 8		애		ei 61	7.	j	1.2 1. - 1.7 –	1.2					-	
	200	~ · · ·	-1		- 2		-			_				-	
	<u> </u>	On 400 ON	- 2	- ~	- 8.9			- 8.4 5.3	40.4						
	8		l		 			1	•						
4.5.5.2 OMS/INCS CONSTINABLES															
	8 	₽ _						_	.						
	8	. <u> </u>	.5			.	•			.	·				
	Ę	:1	5.		_	-	-				- 1				
	8								.		-			•••	
4.5.6 MAVICATION 4.5.6.1 CNBOARD SOFTWARE					.						m _{en} on				
	8		(8E)												
	2		_, -				•	-							
	Ė		-					-					•	-	
	8	·				· ••• ••	. 🚙 🕶				~			• •• ••	
		= c									· •• •• •			_ ~ .	
Notes:															

4.5.6.2 NCC 40000011 C		i						STS 2	STS 2-4 RESOURCES	GRCES					
MCC GROOMELTS CS 1 (TRS) 1 (TR				5	8				CT 198	-			. 1		
HOC OBJORNAL OS 11 CONTINUE O			H 14 16 1	A! 100 J	1	St 01 11 1	14 16	H TY		11 81 0	10 18	=	至	7	50
20 TO TO TO TO TO TO TO TO TO TO TO TO TO	4.5.6.2 NC ASCRIT/DESCRIT	8		(TBS	(, et es <i>e</i>		
2		CONT			-	- -									
SO COURTY TOTAL TO			. 2 .								=	-	· en (111		
2 8 2 8		8		mak (1108	- ~ •			·							
	4.5.6.3 NCC GHORBIT	Ø	, et	9						·					
							 -						9. #		
		3			• ((•	-		
		Ę									** •••	B4 44	-		.
		8	-							~					
			o o				-		·· ·			-			
											.				
															
							. -	. 							
				 - -	 .	. .				 -
						po es-				-			•		
							-	 -		<u>.</u> -	.	-			
			•	• •••	• •••				. .	•••	•••				
Motea:			- -,					- ~					-		
					_	-	-	-	-	-	-				
							•								



14.2.2 dates (Company Company	! - 4.6 POSTFLIGHT (CONTINUED)						SE 2.4	513 2-4 RECORCES						
ONE NAMESTITION OF THE AT HE AT 12 AS 12 A			ថ				6	1861			8	2		
ONS INMEDIALIS ONS INMEDIALIS			W 17	1	0 11 D	=	A1 M	11 31 11	1 10 15	11 15	7	님	5	
Court (386 27 200 200 200 200 200 200 200 200 200	AFORTS													
COUNTRING CASE IN THE COUNTRING CASE IN THE COUNTRING CASE IN THE											,			
Countries Countr	101						<u> </u>				-			
Countries (30 Per Price) Countries (30 Per Pri				.		·								
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	1 4.6.3 CHOMBIT 1 4.6.3.1 ATTITUDE AND POLINTING		- - '											
CONT. (TRC BE FRC) CONT. (TRC BE FRC) TOT. (TRC BE FRC) CONT. (3								. -	 -			 -	
20 20 20 20 20 20 20 20 20 20 20 20 20 2		 	98	<u>a</u>				.						
Comment of the commen	10	-										• •• •		- •
Coorti			- 						* -					_ == •
TOT TOT TOT TOT TOT TOT TOT TOT TOT TOT														
100 10 10 10 10 10 10 10 10 10 10 10 10	1			-										
	101				.6.1 ASC	£-								
					6 1 ga (- -		_=
	» 													
										. - •		.		
										» en en e				. .
	Notes:													<u> </u>

COURTY COURTY (TISS BY PROP) 1.5	(GENETATION (CONTINUED)						518 2-4 REDUNCES	ESOMBCES.					
3 WES (PLUS PLAPE 3 WES (PLUS PLAPE 3 WES (PLUS PLAPE 5 COMPT 5 COMPT 5 COMPT 5 COMPT 5 COMPT 6 COMPT 6 COMPT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 7 TOT 8 ME FINAT 9 MED. JT 7 COMPT 9 MED		1	A: M	A! S!	10	Ξ	G Z	. B1	SI O1 BI	31 71 88	At H	CT 1982	8
OUDDEST CONCLUDED) A PATICAL BLESTION CONTT TOT TOT TOT TOT TOT TOT		 8						· ·					
ONDMEIT (CONCLUDED) NATICAD EJECTION CONTT TOT TOT CONTT TOT CONTT	8			1.5	2:		-		7:	~;			
ODDREIT (CONCLUDED) PATICAD BUBLITOR SOFT TOT TOT TOT TOT TOT TOT TO		1 2		·	1.5	_ \ 		-1		1.1	4		
PATICAL EJECTION SOUTH DESCRIPT DESCRIPT TOT TOT TOT TOT TOT TOT TOT		8				- -		M es =		~ 🚙 •			
DESCENT DESCENT CONT TOT CONT TOT CONT TOT CONT TOT TO	1.6.3 ONORBIT (CONCLUDED)	 8			- -	2							
		- 11	***					-					.
DESCRIPT 1 DESCRIPT CS 1 CONT. TOT 1 TOT 1 CONT.		t				-							P 94 4
DESCENT DECLAIT CONT TOT TOT TOT TOT TOT TOT T		8											
8 10 10 10 10 10 10 10 10 10 10 10 10 10	.6.4 DESCENT												
1007 107 108 BT		8											
101 101		2000			- -				-				
		1 0	<u></u>						·	•			
		8	,										•
		P 64 B4	•-										
0,500		· eu •	· -						-	- -			
: 9970													
) (************************************												

1 4.6 POSTFLIGHT (CONTINUED)		STS 2-4 RESOURCES
	CY 1980	CX 1981 CX 1982
	I JI PI NI AI MI JI JI AI SI OI HI DI JI	P! M! A! M!
1 4.6.4.2 ENTRY/LANDING/GRILS	ma 600 d	
3 5		
TOT		
14000		1 12 10 5 1 15 10 5 1 10 1 1 1 1 1 1 1 1 1 1
1 4.6.5 CONSCHABLES MANAGEMENT 1 4.6.5.1 NON-PROPULSIVE CONSUMABLES		
3		11.1 11.1 1.1 1.1
THOO	an do , , , , , , , , , , , , , , , , , ,	3 13 13
101	m	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
8		
1 4.6.5.2 OMS/RCS CONSUMABLES		
		200 cm cm cm cm cm cm cm cm cm cm cm cm cm
	1 (TBS BY PM2) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	an en e
I AHOO	· • • • • • • • • • • • • • • • • • • •	
60 1 50 2	40 cm	
gas for		
l Notes:		
		
6 6 9		

H & S POSTFLIGHT (CONCLIDED)				STS 2-4 RESOUNCES			
	' 	1360		CT 1981	- e	CT 1982	
•		JI PI NI AI NI JI JI AI SI	101 11 D 1 21 Pt M	At 161 JI 51 A1 St Of	NI DI JI PI NI A!	N 31 31 A1 31	10 III 10
1 4.6.6 NAVIGATION (CONCLUDED)		pr 94 as	, , , , , , , , , , , , , , , , , , ,				
	8						
	8	TACK I	and (14 GEA (MA 1994 (
	Ę				gan (gan)	ge de	-
·· •• •	8	780	,,, (10) (500 (00. 1	m == :	-
1 4.6.6.2 MCC ASCENT/DESCENT	8				50	100 MA GAL	
	8	200				64 ga 4	
· · ·	Þ	NORE I		00 ga 1	pad daga si	M ga (m e. 1
	- - -	NOR :			pa ga (pi ga 1	
1 4.6.6.3 MCC ONGRBIT	8			** Cas Cas	* * * *	P4 000 000 1	M =4 64
· · ·	. E	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		ga es ;	, , , , , , , , , , , , , , , , , , ,		900 B 00 (
•	2	NORE !	pa ma g	pa 600 c	pa Ch (pa 000 q	DA C OA (
	8					, e. e	
				. 40 40			. ~ ~
		, time to			, = .		-
	. =		- CO1 CO1	. 400 Gar	4 Ga Ga		. = =
		-	1			-	T
i Motes:							
• •-							

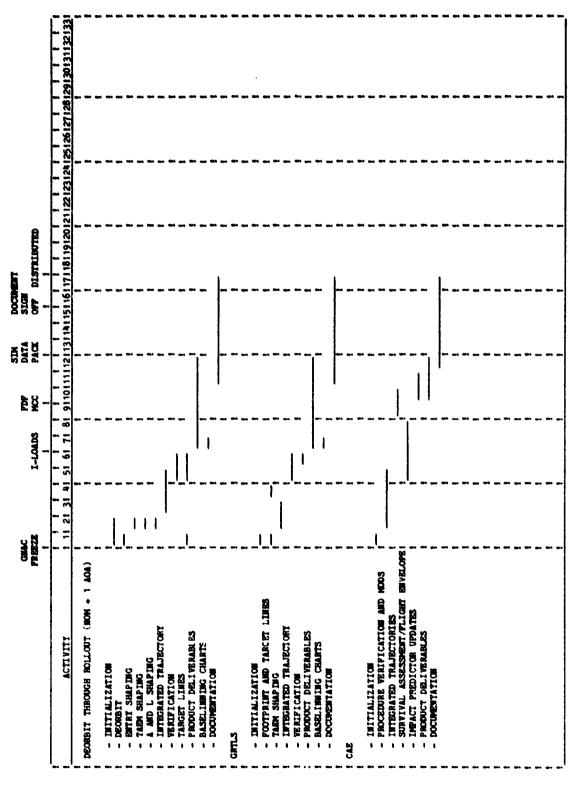
DPLATE FOR DESCENT PLICHT DESICH MEAN TEMP-HIN

201	CRAC PREZZ I-LOADS NCC PACE OFF DISTRIBUTED
ACTIVITY	
DECREET THROUGH ROLLOUT (NOM + 1 AOA)	24
- INITIALIZATION - DEGREIT - ENTET SHAPING - TARM SHAPING - A AND L SHAPING - INTIGNATED TAJECTORY - VERIFICATION - TARGET LINES	
- PRODUCT DELIVERABLES - BASELIMING CHARTS - DOCHMENTATION GINLS	
- INITIALIZATION - POOTPRINT AND TARGE LINES - TAEM SHAPING - INTEGAATED TRAJECTORI - WRITICATION - PROGUCT DELIVERABLES - BASELIMNING CHARTS - DOCUMENTATION	
- INITIALIZATION - INITIALIZATION - PROCEDURE VENETCATION AND MODS - INTEGRATED TALBOTONIES - SUBTIVAL ASSESSMENT/FLIGHT ENVELOPS - IMPACT PREDICTOR UPDATES - PRODUCT DELIVERABILES - DOCUMENTATION	

epplate for descent plicht design nean tens-hun

8	GRAC		Ē	STM	Ē.,										
E	1	7	I-LOADS MCC		-	DISTRIBUTED									
I ACTIVITY	1 1 1 1 1	15 1 4	1 1 61 71	1 1 1 81 91101	111121	1311411	1 1 511611	711811	10216	1 1 1	231241	7 1	1 2812		1321331
I DECREET THROUGH ROLLOUT (NOM + 1 AOA)															
- INITIALIZATION				 .											
E BUTAL SHAPING					1		(
- A AND L SHAPTING	, s			== ·											m m
- TRIED-MARCIONI - PRIFFICATION - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI - TRIED-MARCIONI					 .				 .						-
	po 130 d						ps == ,								ga. 404 ·
- BASELINGING CHANTS - DOCUMENTATION	, ,	- - ,					·		 ••• •		**		 i :		
i GRTLS	po e (
i - IMITIALIZATIOM									-						
		_							-				•		• == •
1 - INTEGRATED TRAJECTORY	··· •··														-
t - VERIFICATION		-			~ .						•:•				-
I - BASELINGING CHARTS													 •		
	•						• •• •		•		• •		. 🚗		• •
! CAE					-										
1 1817-1417-1417-1	.			 .			-		(•••		(
					-				_						
1 - INTEGRATED TREE XTERIES 1 - SIBRIVAL ASSESSMENT OF LEST PROPERTY	:	-		 -											-
INPACT PREDICTOR UPDATES					-		-				-				
i - PRODUCT DELIVERABLES													 .		-
	pa 484	==													
9. 6		 -		 -			- •								
				×											
-															-
											_ =				
6 1 6 2															- •
. =	• ••	•											-		
*									•		•••				•••
		-					-				1		1		

TEMPLATE FOR DESCENT PLIGHT DESIGN NEAR TEMPHAN



TEMPLATE FOR DESCRIT PLIGHT DESIGN NEAR TEMPHAN

	CHEC		è	SIN		DOCUMENT SIGN			
	E ZE -	I-LOADS	물-	PACE -		DISTRINUTED			
>+1212. A	1 1 2 1 1	1 1 1	1 1 1	- 5	1 1 1	1 1 1 1	1 1 1	1 1 1 1	1 1 1 1
	61.31			-	121111	1 1 10 1 1 1 1	C1156165164	12162164	9: 10: 11: 12: 13: 14: 13: 10: 13: 10: 13: 12: 12: 12: 12: 12: 12: 13: 13: 13: 13: 13: 13: 13: 13: 13: 13
1 DEORBIT THROUGH BOLLOUT (NOM + 1 AOA)								 -	
: - INITIALIZATION								. =	
- DECABIT				 .				-	
TAEM SHAPING								-1 cu	
- A ABD L SHAPING	-			-					
. INTEGRATED TRAJECTORY									
- VERIFICATION	·		-					***	-
PRODUCT DELIVERABLES								. =4	
BASELINGING CHARTE			_						-
1 - DCUPERIALION								.	e~ _
I GRILS						. =-			
				 -					-
MOTIFICATION - 1	- •		- .	- •					n •
I TAEM SHAPING									pa 4 84
I - INTEGRATED TRAJECTORY				-				• •••	•
1 - VERIFICATION			_			_		•	-
PRODUCT DELIVERABLES						-			
			•	•				• =-	•
0.4			- -					~ -	
3 V									
			_	-					
	-		- ,	-					
i INTESRATES TRAJECTORIES									
: - IMPACT PREDICTOR UPDATES			٠					×	
- DOCUMENTATION	-		_			-		-	_
			-	- .					-
								*	
			-	_		_			-
	-		_	-		_		-	••
•			- .						
-	. -					-			
				-		_		•	
-			-			-			-
			_	-					